



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



48.1552.



48.1552.



48.1552.



48.1552.



48.1552.









SKETCHES

OF

RURAL AFFAIRS.

“ While the earth remaineth, seed-time and harvest, and cold and heat, and summer and winter, and day and night, shall not cease.”—GENESIS viii. 22.

PUBLISHED UNDER THE DIRECTION OF
THE COMMITTEE OF GENERAL LITERATURE AND EDUCATION,
APPOINTED BY THE SOCIETY FOR PROMOTING
CHRISTIAN KNOWLEDGE.

LONDON :

PRINTED FOR THE

SOCIETY FOR PROMOTING CHRISTIAN KNOWLEDGE ;

SOLD AT THE DEPOSITORY,

GREAT QUEEN STREET, LINCOLN'S INN FIELDS, AND 4, ROYAL EXCHANGE ;

AND BY ALL BOOKSELLERS.

1848.

LONDON:
Printed by S. & J. BENTLEY, WILSON and FLEMING,
Banquet House, Shoe Lane

CONTENTS.

	PAGE
I. THE PLOUGH	3
II. THE SEED-LIP AND THE HARROW	31
III. THE FOLD	61
IV. THE DAIRY	103
V. THE HAY-FIELD	133
VI. THE SICKLE	159
VII. THE FLAIL	195
VIII. THE POULTRY-YARD	223
IX. THE ORCHARD	259
X. THE FENCE	287
XI. THE WATER-COURSE	315
XII. APPENDIX. ENGLAND'S RESOURCES IN TIME OF DEARTH	341
ADDENDA.—RECIPES FOR COOKING INDIAN-CORN MEAL . .	366

ILLUSTRATIONS.

	PAGE
1. FRONTISPIECE	ii
2. THE PLOUGH. Frontispiece—Ploughing	2
3. Vignette	3
4. The Egyptian Plough	7
5. The Plough-frame	14
6. } Plough-shares	15
7. }	
8. } Mould-board or Turn-furrow, with the Share annexed .	16
9. }	
10. The Plough-body	17
11. Small's Chain-plough	18
12. Vignette	28
13. THE SEED-LIP AND THE HARROW. Frontispiece—Sowing	30
14. Vignette—Planting Potatoes	31
15. Real size of Meshes in Wheat-riddle	36
16. Barn-shovel	36
17. Seed-basket	39
18. } Effect of Bad Ploughing	40
19. }	
20. } Effect of Bad Sowing	40
21. }	
22. } Effect of Good Sowing	41
23. }	
42. } Sowing Broad-cast and by Drill	42
25. }	

	PAGE
26. Drill-machine	43
27. Weed-hook	51
28. Dibble	52
29. Bean-drill	52
30. Beans Cultivated on Ridges	53
31. Hoeing Turnips	55
32. THE FOLD. Frontispiece—Scotch Shepherd	60
33. Vignette—Sheep Folded	61
34. The Argali, or Wild Sheep	67
35. South-down Sheep	70
36. Sheep-washing	78
37. Sheep-shearing	80
38. Marking-iron	82
39. The Black Caterpillar	84
40. }	
41. } Cocoon and Chrysalis of the Black Caterpillar	85
42. }	
43. }	
44. } Various forms of Turnip	86
45. }	
46. Hay-rack	87
47. Turnip-trough	88
48. Turnip-slicer	88
49. The Shepherd's Mallet	90
50. The Shepherd's Knot	90
51. Fold-net	91
52. Feeding-box	92
53. The Fold in Winter	95
54. Vignette—Sheep-washing	101
55. THE DAIRY. Frontispiece—Watering Cows	102
56. Vignette—Interior of Dairy	103
57. The Cow	105
58. Milking	108

	PAGE
59. Milking-pail	111
60. Upright-churn	112
61. Barrel-churn	113
62. Annotta-plant. <i>Bixa Orellana</i>	118
63. The Lactometer	122
64. The Curd-cutter	124
65. The Cheese-vat	125
66. Common Cheese-press	125
67. Improved Cheese-press	126
68. Vignette—The Milk-maid	131
69. THE HAY-FIELD. Frontispiece—Loading Hay	132
70. Vignette—Mowing. Round-panicked Cock's-foot Grass. Sweet-scented Vernal Grass	133
71. Fox-tail Grass	135
72. Meadow Cat's-tail Grass	136
73. Meadow Fescue Grass	136
74. Rough-stalked Meadow Grass	137
75. Hay-making Implements	138
76. Hay-tedding Machine	142
77. Mowing	144
78. Whetting the Scythe	145
79. Loading Hay	149
80. The Rick-cloth	151
81. Windle, or Twiner	156
82. THE SICKLE. Frontispiece—The Corn-field	158
83. Vignette—Reaping	159
84. Corn-flowers	162
85. Red Poppy	163
86. The Darnel	165
87. The Weed-hook	166
88. } 89. } Specimens of Wheat:—Hickling's Prolific. Hunter's 90. } White Wheat. Talavera White Wheat	169

	PAGE
91. } Bearded White Tuscany Wheat. Egyptian Wheat.	
92. } Spelt Wheat	170
93. }	
94. Wheat Stem-fly	172
95. Wheat Stem-fly, magnified	173
96. Wheat-midge, magnified	173
97. The Sickle	178
98. The Cradle Scythe	181
99. Two-handed Cradle Scythe	181
100. Reaping with the Scythe	182
101. }	
102. } The Hainault Scythe	183
103. Gleaners	190
104. Vignette—The Barn-door	193
105. THE FLAIL. Frontispiece—Threshing in the East	194
106. Vignette—Unstacking Corn	195
107. Threshing by Horses	197
108. Syrian Drag	198
109. Threshing in England	203
110. The Flail	204
111. Winnowing-machine	208
112. Corn-scoop	209
113. }	
114. } Corn-riddles	210
115. Imperial Bushel	210
116. The Strike	211
117. Sack-barrow	211
118. Chaff-cutting	215
119. Lester's Improved Chaff-cutter	216
120. Threshing-machine	217
121. Section of Threshing-machine	219
122. Vignette—Threshing ¹	221
123. THE POULTRY-YARD. Frontispiece—Feeding Poultry	222
124. Vignette—Feeding Fowls	223

	PAGE
125. The Cock	228
126. Brood-basket	236
127. } Artificial-mothers	239
128. }	
129. Artificial-mother.—Improved form	240
130. The Duck	242
131. The Goose	248
132. The Turkey	251
133. The Kite	254
134. The Turtle Dove	256
135. THE ORCHARD. Frontispiece—Gathering Fruit	258
136. Vignette—The Cider-mill	259
137. Whip-grafting	268
138. Cleft-grafting	268
139. Crown-grafting	269
140. Saddle-grafting	269
141. Apple-branch infested with American Blight	272
142. American Blight, magnified	273
143. The Insect forming a Cradle for its Young, magnified	274
144. Cider-press	279
145. Section of Apple attacked by a Grub	285
146. THE FENCE. Frontispiece—Hedging and Ditching	286
147. Vignette—Different kinds of Fences	287
148. May Blossom	290
149. Fruit of Hawthorn	291
150. Natural Size of ditto	291
151. Ditcher's Shovel	294
152. Ditch and Mound	295
153. Thorn-plant prepared for Planting	295
154. Hedge with Posts and Rails	298
155. Hedge of Coppice-wood	298
156. Hedge with Trees	299
157. Screen-fence	301

	PAGE
158. Formation of a Dry Stone-wall	304
159. Newly-trimmed Hedge	306
160. Dead-hedge	307
161. THE WATER-COURSE. Frontispiece—Water-meadows	314
162. Vignette—The Hatch	315
163. Common form of Water-meadow	321
164. Section of a Ridge with Feeder and two Drains	322
165. Catch-work	323
166. Drain with Conduit	330
167. Another form of Conduit	331
168. Draining-tiles with Soles	331
169. Drain-scoop	332
170. Narrow Drain-spade	333
171. Cylindrical Pipe-tile	333
172. Pipe-tile, with Collar	333
173. Pipe-tile, with Lobed Ends	334
174. Improved form of Pipe-tile	334
175. Plug-draining	334
176. Auger	336
177. Punch	336
178. Jumper	336
179. APPENDIX. Frontispiece—Dantzic	340
180. Odessa	350
181. The Maize-harvest	358

1

12

B





THE PLOUGH

“Man goeth forth to toil.* The PLOUGH
Smooth through the upturned fallow glides;
And as the keel-like share divides
The surface, 'mid the furrow dun
Shows its bright polish to the sun.

“The PLOUGHMAN o'er the yielding land,
With eye intent, and steady hand,
Defines the intended path; and cheers
And guides his steeds, or patient steers,
With voice across the indented plain,
And shaking of the slackened rein.”

BISHOP MANT's *British Months*.

THERE is not a more important duty belonging to the cultivation of the soil than PLOUGHING; and there is not a more ancient or more interesting implement than the PLOUGH. A very pleasant thing it is in early spring to walk abroad into the fields where the fresh-turned

* Psalm civ. 23.

earth sends forth a grateful smell, and there to watch proceedings, as

“Unassisted through each toilsome day,
With smiling brow the ploughman cleaves his way.
Draws his fresh parallels, and, widening still,
Treads slow the heavy dale, or climbs the hill.”

A quiet and easy life does the ploughman seem to lead; his very whistle betokens a calm and contented mind. Regular and slow are his steps; upright is his posture; ruddy are his cheeks; but if you look at him closely, you will observe that his eye is for the most part fixed in one direction. He does not look off from his work; still less does he look back; but he keeps a steady gaze in a direct line before him. Is there, then, any difficulty in the ploughman's work requiring this attention? Is there any art in thus guiding the plough backwards and forwards over the same piece of land for hours? There is. The art of holding the plough, and directing the horses, simple as it may seem, is only to be acquired by long experience; but when a man has once attained it, he becomes a valuable servant; and, supposing his character to be otherwise satisfactory, he is sure to rise in the respect and esteem of his master. Much patient and diligent toil must be gone through before a man can become a good hand at the plough: the same may be also said of sowing the seed, which is often the ploughman's work; but a willing mind, constant practice, and a patient attention to orders, will overcome great difficulties. Moreover the ploughman is encouraged to ask the blessing of God upon his labours; for it is written, “Doth the plowman plow all day to sow? Doth he open and break the clods of his ground? When he hath made plain the face thereof, doth he not cast abroad the fitches, and scatter the cummin, and cast in the principal wheat, and the appointed barley, and the rie in their place? *For his God doth instruct him to discretion, and doth teach him.*” (Isaiah xxviii. 24, 25, 26.)

The tillage of the soil has been the destined lot of man from the beginning of the world. In a state of innocence Adam was placed in the garden of Eden "to dress it and to keep it." (Gen. ii. 15.) And after the fall it was declared to him, "In the sweat of thy face thou shalt eat bread till thou return unto the ground." (Gen. iii. 19.) There is great mercy in this appointment, for it may truly be said in the words of an old writer, "The true handmaide of Virtue is Labour, and the only foe to them both is Idleness."

When people were few on the earth and widely scattered, we may naturally suppose that they cultivated only such spots of ground as they found to yield a good return, and as required the least amount of tillage. Their labour may have been much lighter than ours, and their tools and implements much simpler, as their wants were also fewer or more easily satisfied. Yet with them as with us, Industry alone could secure them from want, and Sloth would most certainly be their ruin. "Therefore to thee whom virtue hath taught to thrive, and honest labour made capable of honest profit, embrace *diligence*, and with a thousand eyes watch, least that ougly monster *sloth*, distill the juice of his hemlocke into thy braine, blasting the happy fruit of thy better labor."

The use of the plough was known at a very early time in the history of mankind; but it was a much simpler implement than ours. At first it was little more than a stout branch of a tree, from which projected another limb, shortened and pointed; this being turned into the ground, made the furrows, while at the further end of the larger branch was fastened a transverse yoke, to which the oxen were harnessed. Afterwards a handle to guide the plough was added.

The Syrian plough was light enough for a man to carry with one hand: it was drawn by oxen, which were sometimes urged by a scourge, but oftener by a long staff with a flat piece of metal at one end, for clean-

ing the plough; while at the other end was a spike for goading the oxen. This ox-goad was sometimes used as a spear. (Judges iii. 31; 1 Samuel xiii. 21.) At one time men followed the plough with hoes, to break the clods (Isaiah xxviii. 24); but in later times a kind of hammer was employed for the same purpose.

Most likely the plough mentioned in various parts of the Bible was not unlike the plough still in use at Nazareth, which consists simply of a small share with only one handle or stilt, having a piece of wood placed crosswise at the top that it may be more conveniently handled by the ploughman. A traveller in the Holy Land,* who saw this plough in operation, tells us that the share scarcely grazes the earth, and the whole plough is so light that a person might easily carry it from place to place in his arms. It is without wheels, and is drawn by oxen: the ploughman guides it with his right hand, and holds in his left a long stick with which he goads the cattle. The share is covered with a piece of broad iron pointed at the end. In Scripture times the ploughshare was sometimes converted into a weapon of warfare: thus in the prophecy of Joel the command is given—"Beat your plow-shares into swords, and your pruning-hooks into spears." (Joel iii. 10.) In the reverse passage in Isaiah, it is foretold, that in that happy period, when the nations of the earth shall not learn war any more, "they shall beat their swords into plow-shares, and their spears into pruning-hooks." (Isaiah ii. 4.)

In Egypt also, where the soil is light, especially at the time of sowing, when the earth has been fertilized by the overflowing of the Nile, the plough is very simple. Egypt, indeed, has always laid claim to the honour of the invention of this important implement.

The plough of the modern Egyptians, which is also partially used in Syria and other parts of Western Asia, *is not so light* in its construction as the Syrian plough,

* Wilson.

and is less elegant than the ancient plough of Egypt, as represented on their monuments.

The Egyptians attached the oxen to the plough by the horns, while the Hebrews certainly laid the yoke upon the neck of the oxen.



THE EGYPTIAN PLOUGH.

The labour attending this sort of ploughing must be of a very light kind; indeed, we are told that the careless, indifferent air of the eastern ploughman would often lead you to suppose that he was traversing the fields merely for his own amusement. This is in places where the soil is light, and where it is not necessary to make deep furrows. But on some descriptions of soil he may be seen giving greater attention to his work, and pressing on the handle of his plough to prevent it from skimming along the surface. Such cases, where watchfulness on the part of the ploughman is necessary to the success of his work, were doubtless present to the mind of our Divine Master when he said, "No man having put his hand to the plough, and looking back is fit for the kingdom of God." (Luke ix. 62.)

The ploughs of Greece and Rome were nearly as simple as *those of the Holy Land*, and among all the

nations of antiquity, oxen were the principal animals employed to draw them.

The Greek plough consisted of three parts—the share-beam, the draught-pole, and the plough-tail; and is supposed to have been not unlike a very simple plough still used in Sicily. Some ancient drawings of early Greek ploughs represent them as having wheels. The Greek ploughmen, living in a beautiful climate, were accustomed to work during the summer months without any clothing; but in winter they wore coats of kid-skins, worsted socks, and half-boots of ox-hides. They were required to be at their work very early, and to pay great attention to it, not letting their eyes wander while at the plough, but cutting a straight furrow. Care was taken to give them proper rest, and good food, and they were encouraged in their labours by a yearly feast. The best age for a ploughman was considered to be forty. The Greek farmers were accustomed to provide a spare plough, that no accident might interfere with their work.

The Roman plough was of the simplest construction, and was generally drawn by one pair of oxen, which were guided by the ploughman, without the aid of a driver. Great attention was paid to the straightness and breadth of the furrow, and no balks, or portions of unploughed soil, were to be left. To ascertain that the work was well done, the Roman farmer traversed his fields with a pole in his hand, which he thrust into the ground in various places. The land was ploughed in square lots of one hundred and twenty feet to the side, two of which lots made their acre; and the ploughman was expected, in breaking up stiff land, to plough half an acre a-day; in free land an acre; and in light land an acre and a half were to be accomplished in the same time. Sometimes they ploughed in ridges; at other times not. They did not make a circuit when they came to the end of a field, but returned close to the *furrow*.

The Greeks and Romans had indeed rude and simple implements to work with, but they were well aware of the most important principles of agriculture. The Greek writers recommend a careful attention to the nature of soils and of manures, and allude to the practice of ploughing in green crops, as enriching the soil as much as dung. The Romans gave their land frequent ploughings: they seem always to have ploughed three times before they sowed; and sometimes, on stiff soils, as much as nine times. They usually allowed their land to lie fallow every other year.

The rude ploughs of Spain are supposed to be as old as the time of the Romans. That used near Malaga is nothing more than a cross, with the end of the perpendicular part shod with iron. It is drawn by two oxen, attached to it by the clumsy contrivance of ropes fastened to the horns. This plough does not penetrate more than six inches into the soil.

In many other countries, where agriculture has made little progress, the ploughs are exceedingly rude and simple in their construction. The plough used in Bengal is merely a crooked piece of wood sharpened at one end, and covered with a plate of iron, which forms the plough-share, and finished at the other end by a handle fixed to it crosswise. In the midst is a long straight piece of wood or bamboo, which goes between the bullocks, and is fastened to the middle of the yoke. The yoke is laid over the neck of two bullocks, and has two pegs descending on the side of each bullock's neck, by means of which it is tied with a cord under the throat. A man or boy holds the plough with one hand, and with the other guides the animals by pulling them this or that way by the tail, driving them forward with a stick.

The ploughs of European Turkey are also very simple, though in some cases they are provided with two wheels. They consist of a share, a beam, and a handle. *The share* resembles the claw of an anchor,

and has its edges shod with iron. These ploughs are drawn by a single horse, by two asses, or by oxen, or buffaloes, according to the quality of the soil.

In some parts of Poland ploughing operations are still conducted in the rudest and most awkward manner. The peasant is his own plough-maker and wheelwright, and often produces a wretched implement, which does scarcely more than scratch up the surface of the land. In that country ploughing has been witnessed, performed by a cow, tied by the horns to the trunk of a young fir-tree, one of the roots of which had been sharpened to serve as a share, while the other served the ploughman as a handle.

Thus has ploughing, in many countries, remained for ages in the same rude state, without any visible improvement in the implements, or the mode of using them. Very different has been the case in our own land. Our plough was indeed in early times as rude as theirs : and no wonder, for every ploughman was compelled by law to make his own plough. No one was allowed to guide a plough until he could make one, nor was a driver permitted to urge forward the oxen unless he was able to make the traces by which they were attached to the plough. These traces were made of twisted withes or willow branches, and the names given to them are still retained among labouring men to distinguish parts of the cart harness, as *wambtye*, *whipple-tree*, and *tail-withes*. The plough itself was of very simple form, but sometimes furnished with wheels. Our Saxon forefathers seem on some occasions to have adopted the barbarous practice of fastening the oxen to the plough by their tails. This cruel custom was also so common at one time in Ireland that the legislature was obliged to interfere to put a stop to it. An act was passed in the year 1634 against "Plowing by the Tayle and pulling the wool off living sheep." It is stated that "in many places of this kingdome there hath been a long time used a barbarous custome of ploughing,

harrowing, drawing, and working with horses, mares, geldings, garrans, and coltes by the taile, whereby, (besides the cruelty used to the beasts,) the breed of horses is much impaired in this kingdome." This practice, and also that of pulling off the wool yearly from living sheep, instead of "clipping or shearing of them," were condemned as illegal, and punished with fine and imprisonment.

The cultivation of the land in this country was much improved after the arrival of the Romans. They taxed every part of the country as it fell into their power to supply them with a certain quantity of corn: and this, instead of being a hardship to the inhabitants, was really a great benefit. They were obliged to exert themselves to plough and sow more diligently than heretofore, and in doing this, they soon found that their fertile soil would produce enough to supply not only their own wants, together with the amount demanded by their conquerors, but also a large surplus for exportation.

But the improvement of the plough itself went on very slowly. For ages, this invaluable implement was more like a clumsy rake for scratching the surface than a plough for turning over the soil. Yet in the time of Fitzherbert (1532,) several varieties of ploughs were in use in different parts of England. He says, "One plough will not serve in all places, therefore it is necessary to have divers sorts. In Somerset-shiere, Dawset-shiere, and Gloster-shiere, the share beame, that in many places is called the plow-head, is foure or five foote long, made very broade and thinne, and that is because the land is very tough, and would sucke the plough into the earth, if the share-beame were not long, broade, and thin. In Kent they alter much in fashion, for there they goe uppon wheeles, as they doe in some part of Hartfordshire, Sussex, and Cornewall. In some countries they will turne the shelboord at every landsend, and plowe all one way. In Buckingham-shiere, *are ploughs of another fashion, and plow-yrons of*

altering shape, both which are more correspondent to my liking then any other, and are fitte in generall for most places, especially if the plough-beame and share beame were foure inches longer, between the sheath and the plough-tayle, that the shelboard might run more a flote: for those ploughes give out too suddainly, and therefore they be the worse to draw, and for no cause els.

"In Cambridge-shiere, Huntinton-shiere, Bedford-shiere, and for the most part of Northampton-shiere, their ploughes have but one hale. In Leistershiere, Lankishiere, Yorkshiere, Lincolnshiere, and Notingham-shiere they have two, for all other countries unnamed, there is none of them but plow with some of these ploughs before mentioned, neither will I stande too strictly upon their fashion, sith there is no country but custome or experience hath instructed them to make choice of what is most availeable, and he that will live in any country may by free charter learne of his neighbors, and howsoever any plough be made or fashioned, so it be well tempered, it may the better be suffered."

This sensible old writer saw the advantages, which have since become still more evident, of studying the nature of the land, and adopting just that form of plough which seemed to suit it best. But it was not Fitzherbert, nor Tull, nor other early writers, that suggested the form of plough which has since been found so useful, and has been brought to so high a degree of perfection. By some means or other an improved Dutch plough was introduced into the north of England, and became the model for our ploughmakers. A patent was obtained in the year 1730 for a plough made at Rotherham, in Yorkshire, which was the most perfect implement that had yet appeared, and is well known to this day as the Rotherham plough. From this time the progress of improvement was rapid. A man in humble life had the honour of taking the first step in that career of invention and advancement, which *from the time of the Rotherham plough to the present*

hour, has successively contributed to the perfecting of this, the most valuable of all tools.

JAMES SMALL was the son of a farmer in the county of Berwick, in Scotland, and early learned from his father all the different branches of agricultural labour. As he grew older, he was apprenticed to a carpenter and ploughmaker, at Hutton, in the same county. After his apprenticeship he came to England, and worked with a Mr. Robinson of Doncaster, in making wagons and other wheel carriages. He appears to have remained about five years in England, but it was not until his return to his native country that he made the improvements in the plough for which his name is celebrated. He settled at Black Adder Mount, in Berwickshire, in the year 1763, under the patronage of John Renton, Esq., of Black Adder. He there established a manufactory of ploughs and other farming tools, and made many experiments on the value of the implements by trying them on some land which he there occupied. At that time the old Scotch plough was chiefly in use throughout Berwickshire. It was drawn by a team consisting of one pair of horses, and four, or sometimes six oxen. The smallest number was a pair of horses, and a pair of oxen attended by a driver. Small endeavoured to make an implement that should be stronger, and at the same time lighter, and easier of draught, than that plough; and he was remarkably successful. A plough was constructed by him, which completely astonished all who had been accustomed to the heavy and clumsy ploughs of the country; and so much more easy was it to work with Small's plough than with any previous ones, that many ploughmen in Berwickshire offered to supply the woodwork if their masters would supply the remaining parts, and pay the other charges of the implement. A great secret of Small's success in what he undertook appears to have been a rule which he laid down for himself, *that whatever he did should be done well and completely, whatever pains and trouble it might cost him to*

accomplish it. So anxious was he on this point, that when he had reason to doubt the quality of an article produced at his manufactory, he would break it to pieces and suffer the loss, rather than send out a plough or other implement which was not likely to give perfect satisfaction.

So great was the zeal of this ingenious man to promote improvements in agriculture, that he is said to have sacrificed his ease, his health, and his worldly interests, to the cause. He died in the year 1793, in the fifty-third year of his age. The value of his improvements will best appear as we consider the different parts of the plough.

Since Small's time a great number of valuable improvements have been made in the plough, and these are constantly going on, so that we may expect a high degree of excellence to be at last attained.

The essential parts of a plough are as follow:—

The body of the plough consists of a *frame*, to which all the parts of a plough must be attached.

This part of the plough was formerly made of wood : it was then covered in the parts, subject to the greatest

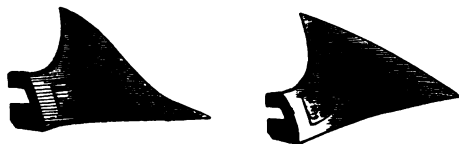


THE PLOUGH-FRAME.

friction, with iron ; and finally, the whole of it was made of cast-iron. The advantages of this were chiefly the *greater durability* of the frame ; the ease with which the

other parts of the plough could be screwed to it, or unscrewed, and the certainty that the frame could always be procured of exactly the same size and shape. This last particular is of much consequence, for with wooden ploughs it is very difficult to get two that will work exactly alike, even if made by the same person. One may work easily and well, and the other be very inferior, although to the eye there appear no difference between the two. The old wooden plough, however, is still in use in many parts of the country.

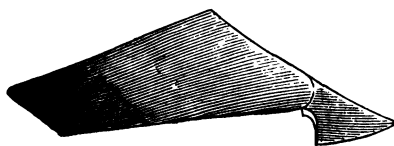
The lower part of this frame is called the *sole* of the plough, and to the front part of it is attached the *share*, which is a sharp instrument cutting in a horizontal direction the slice of earth which is to be turned over. The share gradually widens from the point to what is called the *fin*. It was formerly made of wrought iron, but cast-iron shares are now generally employed. At first these were found to wear away too fast on the under side, thus becoming blunt and inefficient. This was remedied in a very ingenious way: the under part of the share was case-hardened to the thickness of one-sixteenth, or one-eighth of an inch; this hardened surface would not, of course, wear away so quickly as the rest, and thus by the natural wear of the upper part of



PLOUGH-SHARES.

the share constantly going on, a sharp edge was always produced on the under side. The ploughman using this share is not, therefore, hindered with the frequent *sharpenings necessary* for wrought-iron shares.

Another important part of the plough is the *mould-board*. This rises very gradually from the fin in an oblique position, either to the right or left: its use is to push aside and turn over the slice of earth just cut, so as to leave a regular furrow wherever the plough has passed. Originally this part of the plough was, agreeably to its name, a *mould-board*, defended with plates of iron, but it is now made wholly of cast-iron. Small was a great improver of this part of the plough, and constructed it on true mechanical principles. He invented a plan for discovering the true shape which ought to be given to the mould-board by making it of soft wood, and then carefully observing, during many trials, the parts most liable to pressure or to friction; this gave him hints for the construction of his cast-iron mould-board, which has a regular curve or twist, well adapting it for turning over and placing the furrow-slice exactly in the right position, while it also lessens friction in the work. It was a happy circumstance that just at that time the founding of cast-iron was getting very general; Small took advantage of it, and framing



MOULD-BOARD OR TURN-FURROW,
with the share annexed.



a mould-board, &c., of cast-iron, he thus obtained *patterns*, according to which any number of similar forms *might be constructed*.

It is necessary, however, to vary this part of the plough, according to the nature of the soil it is intended for, so that no general rule can be laid down for its formation. In some countries, a short mould-board with a concave surface is the most useful; in others, a long and convex form is preferred. A mould-board which in one description of soil will slide along with an equal pressure, and without getting clogged with earth, in another will work much less freely, and will soon show by the adhesion of the soil that it is unfit for that particular description of land; therefore, every farmer has to act upon his own experience in the matter, and to suit the mould-board to the work he has for it to do.

When the share and the mould-board are fixed in their places on the frame, the *plough-body* is complete, and has the following appearance :—



THE PLOUGH-BODY.

To the fore part of this plough-body is attached the *beam*, generally made of wood, which extends in a forward direction, and is finished at the end by what is called the *plough-head*, a contrivance for regulating the depth of the plough, and the line of draught. The beam may differ in strength according to the quality of the work to be performed, but it need never greatly vary in length; about three feet is considered a good

length for this part of the plough. The beam serves to keep the plough in a proper direction, and to the end of it the horses are attached.

Fixed to the beam, in an upright position, is the *coulter*, a sharp-cutting instrument, very simple, but of much importance to the working of the plough. The point of the coulter nearly meets that of the share, and both the surfaces are directed to cut a clean slice from the land. The coulter cuts in a vertical direction, the share in a horizontal one. The blade of the coulter is about two inches and a half wide; the thickness differs according to the strength required. The setting of the coulter in the exact position in which it will work best, is a matter for the ploughman's own experience.

The *stilt*s or *handles* extend backward in the opposite direction from the beam, and by their means the ploughman keeps a straight line, and also preserves the plough at a regular depth in the ground. The handles are generally about five feet and a half long, and are placed wide enough apart for the ploughman to walk in the furrow. By means of the handles he guides the plough to the right or left, raises or depresses it at will, and brings it round at the land's end out of one furrow into another.



SMALL'S CHAIN PLOUGH.

These are the principal parts of a plough, and are indispensable to its proper working; but in addition to these parts, some ploughs are furnished with one or two *wheels*. Ploughs are indeed of two kinds, those fitted up with wheels and called *wheel-ploughs*: and those

without wheels, called *swing-ploughs*. A great deal has been said, and a great deal has been written, in favour of each, but it must depend upon the nature of the soil as to which are really the best for any particular district. In general, swing-ploughs are considered lightest of draught, but they require an experienced and attentive ploughman; while wheel-ploughs work with greater steadiness, and require much less skill in the ploughman. A district ploughed with wheel-ploughs shows greater neatness of work, but a district where the best swing-ploughs are employed, can boast better ploughmen, and some saving of expense in labour.

Much of the comfort and success of a farmer depends upon the good conduct of his servants; therefore it is his interest, as well as his duty, to keep a strict watch over their behaviour at all times, and to do what he can to promote orderly and sober habits. And a master may do a great deal. His servants look up to him in all things, and are greatly influenced by what he says and does. If he be at the same time firm and kind; if he perform all his duties as a man and a Christian in a conscientious manner; a happy influence will be visibly at work among his servants. But if he set a bad example it will also find copiers. If he employ loud and angry threats, or profane swearing, when he reproves his servants for their faults, the same sort of language will probably find its way into every cottage. The father will swear at his children, and the children will learn to imitate him, and thus the master may lead a whole parish into sin. Again, if the farmer be a sabbath-breaker, making the day of holy rest his time for visiting and feasting with his neighbours, or of performing journeys to distant places, too many of the villagers will shield themselves under his example when they spend the sacred hours in indolence at home, or in carousals at the village beer-shop.

The farmer is anxious to have good workmen and

labourers; but he has himself a large share in making them sober, active, and diligent, or negligent, unthrifty, and lazy. There are some cases where the best example and the best advice seem equally useless to reclaim from vicious habits; but in general the farmer and his family may so act as to become blessings to the whole neighbourhood in which they dwell.

If the farmer has many important duties to perform with respect to his labourers, they on the other hand have many duties to fulfil with respect to him. The ploughman, for instance, has much need of active, diligent habits. There is danger that in keeping on with the same task all day long, and day after day, he should get into a dull, heavy step and lazy gait, which will make him longer about his work than he need be. Many farmers complain of this in their labourers, and say that these slow-going ploughmen teach their horses the same lazy pace; whereas the animals would do their work with quite as much ease to themselves if they were accustomed to a quicker step. This is a bad habit which a ploughman should take particular care to overcome. He should remember that his master is a great sufferer by his indolence; and that his services will never give satisfaction while he indulges in this habit. A ploughman has a long day's work to go through, and will not perform it well without much diligence. His duty is to take charge of a pair of horses, and to work them not only at the plough, but at every kind of work for which they may be wanted on the farm. He has also to take care of his horses, and to groom them between the hours of labour: and when ploughing is not going on, he continues to take care of them, and must also be ready to turn his hand to whatever employment may be required of him, and to do it cheerfully, and to the best of his power. All this cannot be done properly without settled habits of activity, and these the *ploughman* should endeavour to acquire.

The ploughman should be a teachable man, glad

to learn the best ways of doing different kinds of work. He is not always at the plough, but sometimes has to do with sowing, thrashing out the corn, &c. He must therefore get a good deal of general knowledge of farming operations besides mere ploughing. But if he had nothing at all but the plough to attend to, he would still have enough to learn. The following rules, chiefly laid down by an expert practical ploughman,* give an idea of the method of managing a plough; but practice only can teach the particular *knack* required to guide this implement with good effect.

I. The horses should be harnessed as near to the plough as they can be placed without impeding the freedom of their step; for the closer they are to the point of draught, the less exertion will be required to overcome the resistance.

II. When ploughing with a pair abreast, the most forward and powerful horse should be worked in the furrow; but if the team be harnessed in line, and there be any difference in the height of the cattle, the tallest should be put foremost, if he be in every other respect equal to the others.

III. When at work they should be kept going at as regular and good a pace as the nature of the work will permit; for they are thus more manageable and the draught easier than when slow. By due attention to this, the heavy soil will also cling less to the coulter, and the land will be found to work more freely.

IV. The breadth and depth of the furrow being ascertained, the plough should be held upright, bearing equally all along on a straight sole, and be made to move forward in a regular line, without swerving to either side. The edge of the coulter should also be set directly forward, so that the land side of it may run on a parallel line with the land side of the head, and in such a position, as that their slant or sweep may exactly correspond.

* Mr. Finlayson.

V. The ploughman should walk with his body as nearly as possible upright, without leaning on the stilts, and without using force to any part further than may be absolutely necessary to keep the implement steadily in a direct line. He should also be sparing of his voice and of correction to the team: of the former, because too much cheering and ordering only confuses the cattle; and of the latter, because punishment when often repeated, at length ceases to have due effect, and thus leads to unnecessary beating.

These are important directions, especially such as relate to the steady guidance of the plough. In a general way the good ploughman never presses upon the stilts; he is aware in a moment, by a mere glance of the eye, or by quickness of feeling, when the plough is going wrong, and acts accordingly. A mere turn of his hand sets it right again; while in the hands of an awkward ploughman the mischief is doubled by the unnecessary effort made in setting it right.

Every ploughman knows, however, that when the share runs deeper into the soil than was intended, it is necessary either to lean upon the stilts, which is called *steeping*, or to put the draught-bolt of the bridle a little nearer the ground, which is called *giving the plough less earth*. If, on the contrary, the share skims along too near the surface, the stilts must be raised, or the draught-bolt regulated so as to give *more earth*. In the same way, if the furrow-slice be too narrow, the ploughman, by leaning to the right, or setting the draught-bolt that way, gives the plough *more land*; if the furrow-slice be too broad, the contrary must be done, and thus he gives *less land*.

All these things are matters of every day practice; but there are faults connected with them into which the good ploughman is careful not to fall. The plough should move flat upon its sole, but in the hands of *some* ploughmen it seldom does so, for they have a trick of *either leaning forward on the stilts, or of habitually*

leaning to the left. The latter practice makes the furrow-slice thinner on one side than on the other, and at the same time deceives the eye with the appearance of its being of equal thickness throughout, for the thick side is uppermost. Bad or infirm ploughmen lean in this way in order to lighten their work, but it is dishonest to do so, and injurious to their master's interests.

In order that the ploughman may avoid the common errors of his class, he should take care to understand thoroughly every part of his plough, and get a complete mastery of it. And this he can scarcely fail to do, if he has a willing mind, and good common sense. The plough has probably been his companion all his life (for the ploughmen are generally chosen from among the ploughboys), and if he has been sharp and attentive, he can scarcely be ignorant of the make of the plough or of its working under any circumstances. Accustomed from his childhood to see and take part in the management of the cattle, the adjusting of the plough-irons, and other necessary operations, he must have been very dull or very careless not to acquire the sort of knowledge necessary to make a good ploughman. Every lad when first set to work as a ploughboy, or when employed with the harrow, or anything connected with tillage, should remember that if he is diligent, obedient, and anxious to please, he may in time come to be a very useful and valued servant, with regular and good wages; but if he does his work in a careless slovenly manner, and shows a lazy disobedient temper, he will never rise to any honourable service, never be trusted with any important duty, and never enjoy the favour or consideration of his master. Industry at all times and seasons is necessary to a man's success. "The sluggard will not plow by reason of the cold; therefore shall he beg in harvest, and have nothing." (Prov. xx. 4.)

The ploughman's task is an honourable one. When

the importance of a ploughman's duties are well considered, his task rises in our estimation, and appears indeed an honourable one. If those persons are deserving of honour who perform essential services to mankind, farm-labourers may certainly be honoured, since by their unremitting toil the produce of the land is obtained for our use. In ancient times it was no uncommon thing for noble and dignified persons to be engaged in the tillage of their own land. Cincinnatus, a celebrated Roman consul, was found by the messengers sent to acquaint him with his election to that office, in the act of following the plough, for he had retired to a small farm on the banks of the Tiber, where he cultivated the ground with his own hands. It is said that he was less pleased at the honour conferred on him, than grieved for the prospects of his farm during his absence. After restoring tranquillity to Rome, he again retired to his farm and his rural occupations. Our own country has also produced examples of similar conduct. Easterwin, Abbot of Wearmouth, not only guided the plough and winnowed the corn grown on the abbey lands, but also with his hammer forged the instruments of husbandry upon the anvil.* It may well be regarded as an honour to be instrumental in a work which God himself deigns to bless. The ploughman breaks up the fallow ground, and sows the appointed seed, but it is God that gives the increase.†

The ploughman's task is a healthy one. When he sets forth at break of day, breathing the pure air, and listening to the sweet songs of early birds, when he treads the dewy sward, or the furrowed field which sends forth a pleasing smell, he is surrounded with healthful influences, his spirits are cheered, his strength renewed, his whole frame braced for exertion. He has an advantage and pleasure connected with his early rising which the workman in a manufactory knows nothing of,

* Bede.

† See 1 Cor. iii. 6.

although he perhaps has risen equally early to his task.

“ The whistling ploughman braves the wind,
And drives his well-fed steeds along,
Leaving the furrow'd waves behind,
Piled by the ploughshare, deep, and strong ;
Blithely the lark above him springs,
And in the sky's blue temple sings.”

The ploughman has reason to be thankful for his lot in life, and to brave without repining the trials and weariness he may sometimes suffer. To labour is his calling, and if at times he seems over-done with work, he may remember that he is saved from many of the troubles and anxieties which beset those who have to work with their heads more than with their hands.

The ploughman is able to make some provision for the future. A young ploughman just beginning life may certainly, if active and sober, lay by a small part of his wages every week against a time of sickness or of need. He should do this for several years before he thinks of marrying. It is a cruel thing to bring want upon a deserving woman, who has perhaps lived in comfort either at home or in service, up to the time of her marriage. If the couple get into debt and difficulty, there will be little comfort or happiness in home. Their children will suffer the effects of their imprudence, and if they do not actually want for food or clothing, will go without proper schooling, and become troublesome and unruly. The happiness of every cottage depends so much upon the wife, that a poor man need be very cautious in the choice of one. If he marries a sloven or a scold, he will suffer for it all his days. Home, which ought to be a place of rest, cleanliness, and comfort, will be a scene of discord and misery. He will be even more miserable than a rich man would be under the same circumstances, for he has not another room in his house, nor another fireside, to which he might retire from the evil. *Too often in such cases, finding his home un-*

comfortable, he repairs to the beer-shop, and from going there at first under the pretence of escaping from an ill-tempered or a sluttish wife, he at last settles down into a confirmed drinker, and thus doubles the misery of his home, by wasting a large part of his wages. In this downward course he soon proves by experience that they who "plough iniquity and sow wickedness, reap the same." (Job iv. 8.) Therefore a poor man ought to think well before he marries, and to make choice of a prudent, modest, thrifty wife, who will make his home happy, and bring up his children in the right way.

The ploughman has much encouragement in his work. Good ploughing is in these days rightly looked upon as a matter of first-rate importance, and masters are anxious to give every encouragement to really good servants. In different parts of the country there are also ploughing matches established, where ploughmen try their skill one against another, and prizes are given to the most successful. It is not so much the value of the prizes themselves as it is the honour of having performed the work in the most perfect manner that men look at. When a ploughman has carried off the prize of superior skill, he feels new pleasure in his employment, he relates the story of his success to his family and friends with a feeling of honest pride; and while they look up to him as a sort of superior being, they are stimulated in their own endeavours to become skilful workmen in their several departments of labour. "I never knew a ploughing-match meeting established in any rural district," says an agriculturist,* "without very beneficial effects being produced on the characters of the peasantry. It never fails to elevate the ploughman in his own opinion; it induces him to strive to excel in his honourable vocation, to please his employer, and to stand well in the estimation of his richer neighbours. The very assemblage of the neighbouring farmers and gentry to witness the trial of skill, brings out all the

* Johnson.

latent pride of the roughest ploughman. The flowers in his horses' bridles, the network on their ears, the new gay-coloured tape with which their manes and tails are braided, betray the little feelings of honest pride in the ploughman's bosom. * * * Such meetings, moreover, teach even the most ignorant the importance of such affairs, that there is a strange difference in the neatness, style, and profit to the farmer, in the manner in which the ploughmen execute their work ; and they are pretty sure to convince even the most listless that there is more skill required in a ploughman than many persons would readily believe."

Thus it seems plain that *a ploughman has many good reasons to be contented and happy* in the station God has placed him in, and many great encouragements to be sober, honest, and industrious. If his toils are arduous, he has his seasons of rest, and especially the weekly day of rest, so mercifully appointed for man. It is one of the pleasantest of country sights to witness the clean, well-dressed labourers repairing with their families to the village church. Traversing the high-road, or lane, or bye-path, they come from various quarters to the house of God ; their honest sun-burnt faces gladdening one's heart to look upon. The reverent air with which most of these humble sons of labour enter the village church, might read a lesson to the children of fashion, flaunting in gay attire.

" When once thy foot enters the church, be bare,
God is more there, than thou, for thou art there
Only by his permission. Then beware,
And make thyself all reverence and fear."†

Besides the great privilege of assembling to worship God, and to hear His Holy Word explained, Sunday brings with it other privileges and pleasures. The labourer has little leisure during the week to talk to his children, or to enjoy a comfortable meal with them.

† George Herbert. "The Church Porch."

But on this day he does both. He hears his children read a chapter or two in the Bible, and he tries to teach them a few simple lessons therefrom. He and his wife take care that they are sent neat and clean to the Sunday-school, and that no vain excuses keep any one of the family from attending church. The wife perhaps stays at home one part of the day to cook the food, or to attend to an infant, but she takes care not to lose both services, unless sickness in her house keeps her away.

Religion affords the only true consolation a mortal can have through life, and in the hour of death; therefore it behoves every one of us to seek above all other things to become deeply and truly religious. God has given us public and private means of grace, all of which it is our bounden duty to use in dependence on his blessing. It is a happy thing for the poor and unlearned that not to the wise and mighty alone, but to the poor the gospel is preached; but if they withdraw themselves from that preaching, forsake the assembling of themselves together in the House of God, and neglect the reading of the Holy Scriptures in their own homes, what reason have they to hope for any blessing from the Lord? what expectation can they have, indeed, but that their hearts will become hardened against every holy influence, and their condition become worse and worse, both for time and for eternity? "Godliness is profitable for all things; having the promise of the life that now is, and of that which is to come." (1 Timothy iv. 8.)

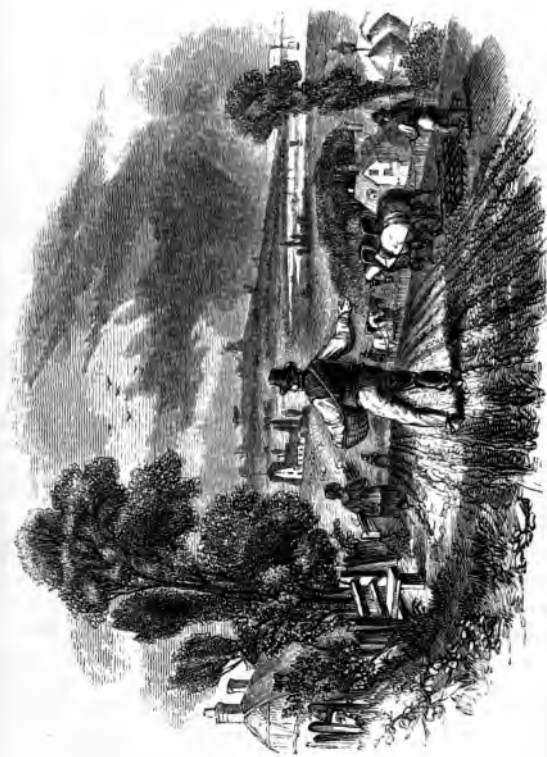


1

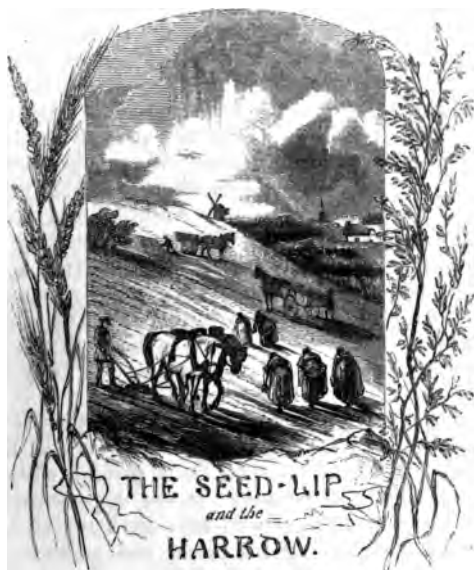
2

3

4



BOWING.



THE promise of the Lord standeth sure, that, "so long as the earth remains, seed time and harvest, cold and heat, summer and winter shall not cease." There are, indeed, years of comparative scarcity, when the earth does not yield her full increase, but there are also years of great abundance and plenty, when the ground brings forth "some thirty, some sixty, some an hundred-fold."

It is man's business to sow the seed : it is God's prerogative to give the increase : "In the morning sow thy seed, and in the evening withhold not thine hand : for thou knowest not whether shall prosper, either this or that."—*Eccles. xi. 6.*

Sowing is one of the most important duties of the year, and is also a very interesting sight, especially when performed in the primitive manner, without the aid of machinery. As we watch the careful labourer treading the field with measured steps, and casting far and wide the destined grain, we are strongly reminded of our dependence and feebleness. We can prepare the ground; we can scatter the bare wheat and other grain; and what further can we do? Nothing; but simply leave it in the hands of the God of seasons, trusting that he will prosper the work, and give to every seed a new and living body. For we sow "not that body that shall be, but bare grain, it may chance of wheat, or of some other grain. But God giveth it a body as it hath pleased him, and to every seed his [its] own body." 1 Cor. xv. 37, 38.

A farmer's life, perhaps more than any other, is calculated to call into exercise the patient trust and hope, which become Christians, and it is painful when we hear complaints and repinings at the dispensations of the Almighty, from those who have such repeated opportunities of witnessing his power and goodness, and who know how frequently he brings good out of apparent evil, and causes a year which began with darkened prospects, to be at length "crowned" with his goodness, so that "the clouds drop fatness."

To make a diligent use of the present, and to look forward with cheerful hope to the future, is the duty of those who till the soil, as well as of those who follow the other various occupations of life. But to the farmer it is a matter of absolute necessity to be constantly looking forward.

"Beyond bleak winter's rage, beyond the spring
That rolling Earth's unvarying course will bring,
Who tills the ground looks on with mental eye,
And sees next summer's sheaves and cloudless sky;
And even now, whilst Nature's beauty dies,
Deposits SEED, and bids new harvests rise."

No sooner has the cheerful sound of *harvest-home* announced the close of one year's labours, than the farmer immediately begins to prepare for the next. "Ceaseless," indeed, is the "round of rural labour," scarcely an interval being left in the whole year without its needful task.

The great business of autumn or early winter is *wheat sowing*, for that invaluable plant is able to bear the changes of our climate without serious injury. A large proportion of land in this country is very well suited to its culture, having that firmness arising from a certain portion of clay, which agrees so well with this crop. But a very slight difference in situation or exposure will often produce a very great diversity in the fertility of the land, so that in this country no two farms are precisely alike, or capable of exactly the same treatment. This is, perhaps, an advantage to British farmers, making each more independent in his operations, and more disposed to exercise his own judgment and ingenuity, than to lean on the opinions of others. The systems which are suitable for other farms might not be advantageous for his, therefore he is careful how he gives up an old method, which has proved a profitable one, for a new method, which may prove a failure. This feeling has, in some instances, been carried to excess, and has checked the progress of agricultural improvement.

Each farmer knows, by experience, on what part of his land wheat may be sown to the greatest advantage: he remembers the motto, common among practical men—"Consult the nature of the soil;" and he loses no time in clearing the most desirable fields for this important crop. Breaking up the summer fallows, or clearing away the potato or other crops which wheat is to follow, he may be seen actively employed during September, October, and November, in preparation for, and in the actual business of, sowing.

But this operation is not carried on without due re-

gard to the weather and the sort of grain chosen for seed. An old and quaint writer* on agricultural affairs says,

“ Who soweth in rain, he shall reap it with tears ;
Who soweth in harms, he is ever in fears ;
Who soweth ill seed, or defraudeth his land,
Hath eye-sore abroad, with a corsie at hand.”

Respecting the variety of soils and the benefits of good cultivation, the same writer says,

“ Each soil has no liking of every grain,
Nor barley and wheat is for every vein ;
Yet know I no country so barren of soil
But some kind of corn may be gotten with toil.”

The sowing of wheat in autumn, if on strong clay or cold soils, is commenced as early as possible, that the plants may obtain strength in the ground before frost sets in. From the middle of September to the end of October is, therefore, considered the best time for sowing upon such soils. The future growth of the crop greatly depends on its gaining strength before winter ; the soil itself, also, if naturally cold, is in better working condition at an early than at a late period. Nevertheless, there must be judgment used in the matter, for wheat when sown too early is liable to run to straw, or become what is called *winter-proud*, and the grain prove light in the ear. On those soils, known among farmers as strong loams, or deep hazel moulds, sowing is deferred to a later period, as there is danger on all warm and rich soils of the plants growing up so rapidly as to become weak and spindling. The month of November is the usual sowing time on such lands, and also on chalky and gravelly soils, unless in cases where spring-sowing is intended. The state of the weather, after all, will chiefly influence the farmer, and will often hasten or defer the sowing season.

The best time being chosen for the work, it is also necessary to get the best seed wherewith to sow the

* Tusser.

ground. Full, plump, sound, and healthy seed, free from weeds, is chosen or reserved by the farmer. The soil on which the seed-corn has been reared, and the greater or less likelihood of its thriving on the land in which it is about to be sown, are considerations not overlooked by practical men; indeed there is an art in the choice of seed which experience only can teach, and which is more important than many farmers seem to imagine.

But however fair this well-chosen seed may appear to the eye, it is yet advisable to use some precaution before it is placed in the earth, to preserve it from a disease which may possibly attack it during the ensuing summer, and render the crop almost worthless. This disease is called *smut*, from the sooty appearance of the ears infected with it. Now it may seem strange that anything done to the dry grain, before it is laid in the ground, should be able to preserve the young plant from this disease; but so it is. Although many persons, and even some few farmers, affect to despise the means employed, and to consider the benefit merely fanciful, yet the majority are decidedly in favour of it, and never think of omitting the simple precaution, which is this: to steep the grain in brine, or some other strong liquor, and afterwards to sift over it some newly slaked lime.

Steeping is, therefore, one of the preparatory steps to sowing, and is generally conducted in the straw-barn, where tubs have been set for two or three weeks previously to contain the steep. Although some persons use strong brine, and various other steeps, nothing is more effectual or more generally used than chamber-ley. When this has been kept a proper time, and is giving off its ammonia freely, the operation is conducted somewhat in the following manner. A basket, holding about half a bushel of wheat, is filled with corn, and lowered by a pair of handles (which stand upright on its rim) into the tub far enough for the steep completely to cover the corn without reaching the hands of the operator.

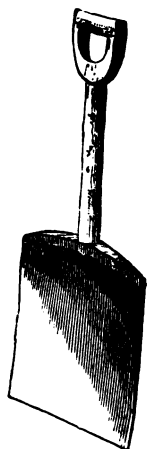
It is held in this manner about two or three seconds and then lifted up and placed upon two sticks over an empty tub to drip, until another basketful is ready. The first basketful



REAL SIZE OF MESHES IN
WHEAT RIDDLE.

is then poured out upon the clean floor of the barn, while the second is placed to drain. Meanwhile, a person stands with a barn wheat riddle near the heap of grain, and shakes over each basketful, as it is poured out, a little slaked caustic lime. Some farmers allow their wheat to remain a bushel at a time in the tub of ley

for five minutes, or upwards, stirring it up, and skimming off light grains that float on the top. But they do not ever exceed ten minutes, because the steep is of so powerful a nature that it would destroy the vegetative power of the grain.



BARN SHOVEL.

When the whole heap of pickled and limed wheat is lying on the floor of the barn, it requires thorough mixing, until the whole mass appears uniform. Two men, provided each with a barn shovel, now stand opposite each other, and make their shovels meet on the floor underneath the heap, turning the grain repeatedly, until the lime is fully incorporated with it. The pickled grain is then put in clean sacks, and carted at once to the field, only a sufficient quantity for the day's use being pickled at once for fear of injury to the grain. Thus does the farmer

prudently supply his ground with seed on which every precaution has been bestowed to ensure its fertility.

“Seed well prepar’d, and warm’d with glowing lime,
’Gainst earth-bred grubs, and cold, and lapse of time ;
For searching frosts and various ills invade,
Whilst wintry months depress the rising blade.”*

The value of this practice of steeping wheat is proved by numerous testimonies. In the Northumberland Report an instance is given of a farm where wheat was annually grown to a large extent for a period of more than forty years with only one case of smut, and this was when the seed was not steeped. In another case, in the same county, experiments were tried with grain infected by smut. One third of this grain was steeped in chamber-ley, and limed ; one third was steeped and dried, but not limed ; and the remainder was sown without steeping or liming. Of these, the first and second were almost entirely free from smut, while the third was strongly infected, and had abundance of smutty ears. Some experiments made in Derbyshire show that brine may be employed with equally good effect. A peck of very smutty wheat was taken, one half sown as it was, the other half washed in three waters, and then steeped for two hours in brine strong enough to float an egg. The unwashed seed produced a wretched crop, two-thirds at least being smutty ; the washed and pickled seed, on the contrary, produced a perfect crop, without a single ear of smut.

We said that the pickled wheat must be taken to the field in *clean* sacks. If this be neglected, and the grain be put into sacks which had before held smutty grain, the pickling will have been of very little service. A trial of the infectious nature of smut was made by placing a quart of fine wheat for two days in a bag where some of the black dust was left : on being sown this grain produced a smutty crop. This, perhaps,

* Bloomfield.

explains the reason why some persons complain of the little benefit they have found from pickling their wheat. Doubtless their sacks or their barn floors have communicated infection to the seed. It is a good practice to wash the walls of the barn with lime-water, and to steep the sacks in the same.

The only disadvantage with pickled wheat is, that the lime acts on the skin of the sower's hand, causing it to shrivel. The lime also rises in fine dust, especially in windy weather, and irritates the eyes and face. Any ill consequence may be prevented by first moistening the face and hands with milk, and then washing them with warm water and soap. It is also a good plan to rub in a little butter on the back of the right hand, and on the eyelids before going out to sow. This, of course, applies to the old method of sowing by hand, which is still extensively practised, though it is every year giving way to the more general introduction of machinery.

There is scarcely a greater instance of skill in the whole round of rural labour, than that displayed by an expert sower. To an ordinary looker-on there is something truly wonderful in the exactness with which he regulates the quantity of seed to an acre, and distributes it equally over every part of the ground in measured casts, step and hand always keeping pace with each other. At his left side is a sowing basket holding the grain, suspended from his neck, or across his shoulders, by a piece of girthing; or perhaps he wears the wooden seed-lip, being a box of peculiar form, which is suspended in a similar manner. Keeping the hand low, taking up the seed firmly, and making at the same time short steps in advance, he casts forth the seed with every step, making it fly in a curve in front, by a sharp turn of the hand, and a free opening of the fingers towards the end of the cast. Thus he has great command over his work, even in windy weather, while a person who takes long steps,

holds the seed loosely, and makes high casts, generally wastes the grain, and makes bad work in the wind. Some sowers use both hands at once, and for this purpose have the seed-lip strapped round the waist, and made in a curved form to suit the shape of the body and extend from the right to the left side: but there are few men who can sow well double-handed, as it rarely happens that the left hand acts with equal power to the right.

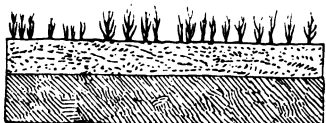
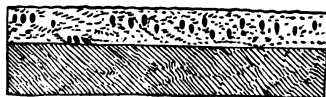


SEED-BASKET.

In Ireland and Scotland sowers use a piece of linen sheeting cut into a peculiar form, and slung across the right shoulder. This is called the sowing-sheet, and is often literally nothing more than a common square sheet knotted together at three corners; but when properly shaped and sewed it is more convenient for use. Although extensively used, the sowing sheet is inferior to the seed-lip, because it does not allow the sower to measure the handfuls so accurately.

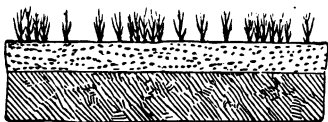
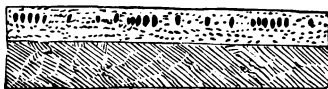
The difference between the work of an experienced and of an inexperienced sower is plainly revealed when the young wheat begins to spring up. In the one case the regular appearance of the crop satisfies the eye, and defies it to trace the particular casts; in the other every cast made by the sower can be distinctly traced, the seed not being equally spread, but in some places sown too *thickly*, while in others it is comparatively

bare. This is not merely unpleasing to look at, but it is a positive waste of corn, and injury to the crop. There are two ways in which such irregularity may happen to the crops. In the first place the land may



EFFECT OF BAD PLOUGHING.

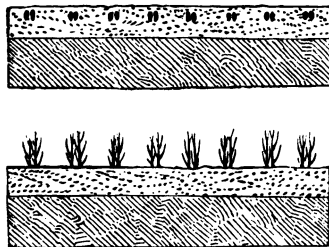
have been badly ploughed, causing the seed to be cast at different depths, some near the surface, and others too deep to come up quickly, if at all. In the next place the seed may have been badly sown, as above described,



EFFECT OF BAD SOWING.

and may therefore be in some parts so crowded as to prevent free growth, in others so scanty as to leave the ground bare. This want of uniformity is a great mischief, for it is only when grain is sown at equal depths,

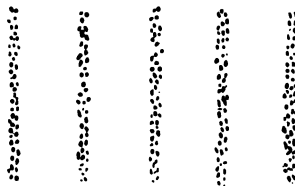
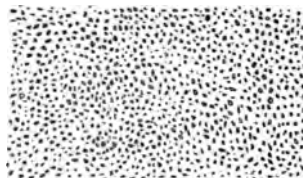
and at equal, or nearly equal distances, that the plants can attain equal height and strength.



GOOD SOWING.

Autumn wheat is always sown broad cast in Scotland, except in the neighbourhood of large towns, where it is sown in rows with the drill. The latter method is now extensively used in England. One great advantage attending it is, that the weeding of the land can be carried on much more conveniently between the rows than when the crop is scattered indiscriminately all over the surface.

However experienced and skilful the labourer, and however careful the farmer himself, there will be times during the sowing season, when the work, if done broad cast, will be slighted, and the labourer will relax in his industry. The evil result appears when it is too late to remedy it, and the farmer, annoyed at these signs of negligence, is at length willing to adopt a machine which promises to ensure perfect regularity. It is thus that sowing-machines gradually make their way in England, although they are for the most part complicated and very expensive pieces of apparatus. Their great cost has doubtless been the principal barrier to their general introduction in Scotland, where farming operations are for the most part carried on upon a simpler and less expensive plan than in England.



SOWING BROAD CAST AND BY DRILL.

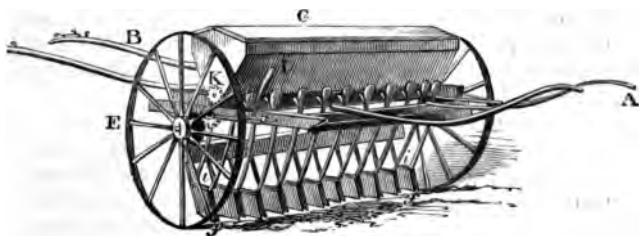
Although drilling machines are comparatively a modern improvement in our agriculture, yet we have no right to claim the invention as one of recent date. The cultivators of China and Japan have drilled and dibbled in their seed from time immemorial.

Timbowtski, a Russian officer who conducted a mission to and from Peking in 1821, says, "We saw some Chinese at work in the fields. Their usual plough, which resembles ours (Russian), is drawn by two oxen; then they employ a sowing-machine, which has a great resemblance to the plough, and has three hollow teeth with iron supports; above the wheel there is a box, from the bottom of which the seed falls through the teeth, which are about an arsheen (twenty-eight inches) in length, constantly following the motion of the plough in the furrows. Behind is a small wooden roller, which covers the seed which has been sown, and supplies the place of a harrow. This plough is so light that it may be lifted with one hand. If the harvest in China produces *fifty, seventy, and even a hundred fold*, the

cause will be found in the care with which they manure the ground, the custom of sowing early, of weeding and watering; besides, the furrows are from seven to fourteen inches distant from each other, which gives the corn room to grow freely."

The Hindoos also are well known to employ the drill system, which, among a people so little liable to change, is an argument for its great antiquity.

In the Museum of the Highland and Agricultural Society of Edinburgh is a series of models of Hindoo agricultural implements, and among them an interesting model of a drill machine; rude in its construction, but possessing all the essential points of the more elaborate modern implements; all of which, of whatever degree of merit, can therefore only be considered as improvements on the Hindoo model. As long ago as 1669, Evelyn made mention of a drill plough, which had been invented in Germany, and had found its way into Spain.



DRILL-MACHINE.

The essential parts of a drill machine are easy to be understood, although some of the improved forms of the implement have the appearance of being very difficult and complicated. The simplest description of a drill we have met with, is that given by Professor Low, who describes it as generally consisting of a frame-work of wood, placed upon two wheels, and supporting an oblong box for seeds.

From the axle of the wheels, motion is communicated to a spindle or axle, K, which passes horizontally through the lower part of the seed-box. Upon this axle are fixed, at certain distances, a series of grooved or fluted cylinders. There are apertures near the bottom of the box, and as each cylinder revolves amongst the seeds, a certain portion is collected in the grooves at each revolution, and is carried round and falls through these apertures.

It then passes into tubes or funnels, *i*, by which it is directly conveyed to the ground. Immediately before the lower part of each funnel, is a sharp hollow coulter of iron, *f*, which encloses the lower part of the tube, and makes a rut in the ground, into which the seed falls. The cylinders in the seed-box can be set at any distance apart, to suit the particular seed which is being sown, and the whole action can be stopped by using the lever L. The coulters may also be set at different depths, so as to make the rut shallow or deep. These, with the tubes or funnels, are so contrived as to be easily lifted up at the turnings of the ridges, or when obstacles come in the way. This is effected by elevating the handles A A.

Numerous varieties of drill-machines are now made, but, perhaps, one of the best is that known as the common lever or Suffolk drill. This is adapted for drilling corn over either level ground or ridges, and on all descriptions of soil. It is furnished with independent levers, by which the coulters are *each* readily and separately made to avoid any masses of stone or irregularity of soil, and a press steel-yard to force the coulters, if necessary, into the hard ground, with a varying degree of pressure, according to the resistance to be overcome. These coulters can be set so as to drill the corn at any width. The corn-barrel or seed-box of this machine delivers from two pecks to six or seven bushels per acre, of any kind of grain, and has an additional barrel for *turnip seed, &c.*; and again, these barrels, by a simple,

yet excellent regulator, are kept on unequal and hilly grounds, on the same level, so that the grain is evenly delivered, whatever may be the situation of the drill. The weight of this machine varies, according to the number of coulter, from three to ten hundred weight, and it is drawn, according to circumstances, by one, two, or three horses.

Numerous arguments for and against drilling are employed by the advocates of different systems of farming; but on the whole it appears, that wherever it can be employed, it promotes the destruction of weeds and fertilizing of the soil, as well as introducing habits of neatness and order, to say nothing of its chief benefit in the improvement of the crop. Sinclair, in his Code of Husbandry, speaks thus decidedly in its favour:—"There is every reason to believe that the system would become general, were it once admitted to be an *established maxim*, that drilling corn, like drilling turnips, is superior to broad-cast. Farmers would then prepare for it, by furnishing themselves with the necessary implements, and by dressing and clearing the soil with peculiar and minute attention. There might still be some exceptions, as on very strong clays, or in very unfavourable seasons; but these exceptions, as in the case of the turnip, would be every day less numerous. Our fields would then be cultivated with the same zeal and neatness as our gardens, and would become equally productive. On the whole, such is the importance of the drill system, that its general adoption ought to be promoted as far as practicable. Models or engravings of the simplest and best machines, and directions for their use, ought everywhere to be circulated, and liberal encouragement given to those who will prove, by accurate experiments, in districts where it is at present either entirely unknown or but little practised, the utility of the system, and the profit to be derived from it. By the extension of drilling, inferior soils might soon be *made nearly as productive as those naturally more*

fertile. In many cases, also, by the introduction of this system, naked fallows might be abolished, where at present they are unnecessarily practised; and, by these means, a treasure of solid and permanent wealth, in useful and valuable produce, might be rapidly spread over the whole surface of the country."

It must also be reckoned one of the great advantages of the drill system, that manure can be applied to the earth in a very economical manner, by the same machine which sows the corn. Indeed, the use of the manure-drill, and of those artificial fertilizers, which are expressly prepared for its use, are reckoned among the most important acquisitions to the upland farmer, who is, perhaps, at a great distance from the supplies of ordinary manure, which others obtain. The drilling-machine in general use can be easily adapted to this purpose, by adding a manure-box to it. Within the last few years, however, a great improvement has been made by the use of separate coulters for manure and seed. When the seed and manure were deposited at the same time down one funnel, they were often closer together than was desirable, especially with the more powerful manures; and, it sometimes happened, that the manure was not deposited in its best position, which is under the seed. But by the present plan, the first set of coulters make a deep furrow, and the manure is thus placed two or three inches deeper in the ground than the seed, and also nearly a foot in advance of it, so as to give the soil time to cover the manure before the next coultter deposits the seed.

The great cost of the drill-sowing machines has led to a practice in some parts of the country of letting them out to hire, in the same manner as thrashing machinery, &c. The owner of a drill-machine, therefore, travels the country with it at seed time, and undertakes to sow the seed of any farm, where the farmer may require his services. He does this at so much per acre; *the farmer supplying the horses, and undertaking to*

deliver the machine on the farm where it is to be next employed.

When the seed has been committed to the earth, whether broad-cast or by drill, the harrows immediately follow the sowers, and complete the work.

The harrow is one of the simplest of agricultural implements, and appears to have been used at a very remote period, nearly in its present form. It consists of a simple framework of wood, having four stout bars placed lengthways, and the same number of lighter bars placed crossways. Into each of the former are fixed, at intervals, iron spokes or *tines*, which act as the teeth of a rake, in breaking up the surface of the ground, and covering in the seed. Two harrows are commonly coupled together in working, and thus a greater surface of ground is covered. The horses are attached to this implement by means of a system of chains and hooks, connected with horizontal bars, called *swing-trees*.

Harrowing appears to be a very simple operation, and would seem to need scarcely any effort on the part of the horses or their driver; but it sometimes happens that it is a work of considerable labour. The design of harrowing is not merely to cover the seed, but to stir the soil thoroughly, and to bring to the surface, and break asunder, all the larger clods. When the tines or teeth of the harrow are long and well sharpened, and when the horses are kept at a brisk pace, this is very effectually done, the tines taking a deep hold on the soil; but on this very account the labour is greater for the horses. When the work is well done, the ground feels uniformly smooth, and the clods lie free upon the surface, instead of being half-buried in the soil. This uniformity being attained, the harrowing should cease; for in light soils, it is sometimes found, that over harrowing brings the seed up to the surface again.

The rough appearance of the land in winter often surprises the *ignorant*, who are disposed to wonder, that a *small and delicate grain* should be able to thrive while

buried beneath the clods. But this roughness, instead of being injurious, is actually serviceable to the young plants, which spring up under the shelter of the clods, and are protected by them from wind and frost. The effect of frost is to make the soil crumble to pieces, and in this way it at length acts on these clods, which gradually moulder and fall apart, deepening the soil around the young plants, and thus conferring a second benefit upon them. Therefore, to harrow the land until there were scarcely any clods left, would be a great mistake in this case. Another danger from over-harrowing is, that, "whenever the land is harrowed as fine as meal with autumn wheat, the rain never fails to batter its surface into a crust, and the frost heaves it up in spring like fermented dough, and this action raising the plants along with the soil, they are exposed on the surface after the frozen earth has subsided, on being thawed in the sunshine. This can only happen, however, when a considerable quantity of moisture exists under the surface."

Every one knows that the wheat crop is very much affected by the state of the weather during winter. An early fall of snow is generally a great benefit to it, wrapping it as in a mantle, and preventing the temperature of the soil from sinking below freezing; but a late fall of snow, following a mild and open season, is very injurious, especially if it lies long on the ground. The wheat plants having then attained some size, are, perhaps, pressed down, and unable to rise again, or they are actually destroyed and made rotten by it. Sometimes when wheat has escaped all other dangers, it is seriously injured by the sharp frosts of early spring, which frequently follow very bright, sunny days. The effect of this alternate heat and cold on our wheat crops has been thus described:—"The frost draws the moisture of the ground to the surface, and there freezes it; *when the sun shines upon the ice, it melts, and most frequently very rapidly, and the consequent evaporation*

produces such an intense degree of cold, as even to kill the plant suddenly; and if they escape destruction in this way, the damp ground that had been raised up by means of the expanded condition of the ice, suddenly contracts by its melting, leaving the plants with their roots half drawn out of the earth, in which state many perish."

When we consider the frequent changes of our climate, and the danger to wheat from these severe and late frosts, and when we are also made acquainted with the numerous insect enemies that beset this valuable plant, it is only surprising, and a matter for much gratitude, that our losses are not more serious and general than they are, and that year after year we are blessed with good average crops, if not always with very abundant harvests. The farmer watches the varying appearance of the crop with feelings of which others can have little notion. He observes the bluish hue caused by long continued rains, the bright and vivid green produced by dry weather in spring, and the brown tinge at the points of the blades, which betokens spring frosts, or easterly winds. In cases where much damage has been done to winter wheat, he endeavours in some measure to repair his loss by sowing afresh in spring.

The culture of spring wheat is not generally recommended, but in some instances it proves advantageous, and, as above noticed, it is sometimes had recourse to as a compensation for losses during winter. About the middle or end of March is reckoned the best time for sowing this description of crop. At the same time with it, seeds of clover, rye-grass, or other grasses are deposited on the same land, and whether spring wheat be sown or not, such seeds are sown on the surface of the land, where winter wheat is growing. The harrowing and rolling which are necessary to cover in these seeds, instead of disturbing the wheat crop, prove an advantage to it. In the days of Tusser, the benefit of rolling wheat *had been proved*.

"If clod in thy wheat will not break with the frost,
If now ye do roll it, it quiteth the cost ;
But see when ye roll it, the weather be dry,
Or else it were better unrolled to lie."

The clover or other grasses, grow up under shelter of the young wheat plants, but they do not come into use the same season. Indeed they seldom flower during the first summer, but may be seen, small and green, among the wheat stubble in autumn. They continue to grow during winter, and in spring they shoot forth vigorously, and soon come into full perfection.

The sowing of wheat broad-cast, and by drill, has now been described; but we must not omit to notice another method called dibbling, which is rather extensively practised in Suffolk, Norfolk, and on the lighter lands of Essex. The soil being duly prepared for the crop, a light roller is passed over it. A man then walks backwards, with an iron dibble in each hand, with which he strikes two rows of holes in each sod, and he is followed by children, who drop a few grains in each hole. The seed is covered in by a bush-harrow, and sometimes by a roller. A bush-harrow is a frame of wood, interwoven with the smaller branches of trees, which, being dragged over the soil, gives a light covering of earth to the seeds. This method of sowing answers well on the loose and sandy soils, where it is chiefly employed.

Next in importance to the wheat crop is barley, which is properly sown in spring, though sometimes, to suit the convenience of the farmer, it is sown in autumn. This crop ripens early, and therefore may be sown late. April is the usual month, although it is sometimes deferred till May. Tusser's advice on this point is,

"Sow barley in March, in April, and May,
The later in sand, the sooner in clay,
What worse for barley than wetness and cold ?
What better to skilfull, than time to be bold ?

"Who soweth his barley too soon, or in rain,
Of oats and of thistles shall after complain.
I speak not of May-weed, of cockle, and such,
That noieth the barley so often and much.

"Let barley be harrowed, finely as dust,
Then workmanly trench it, and fence it ye must.
This season well plied, set sowing an end,
And praise and pray God a good harvest to send."

Barley succeeds well on a lighter description of soil than would be adapted for wheat. It frequently follows turnips and other green crops in spring. This grain may be sown either broad-cast or in drills, and is always the better for being rolled immediately after the harrow, or as soon as the young plants are above ground. The seeds of clovers and grasses are sown with this crop, in the same way as with wheat, either when the seed is first deposited in the soil, or when the plants have appeared.



WEED-HOOK.

Oat-sowing is also carried on during March and April the best time being early in March. This crop is generally sown after grass, as it grows better on old grass land, than any other crop. It is in some cases sown after turnips, or other green crops, when the soil is of a nature that seems better adapted to oats than to wheat or barley. Oats are generally sown broad-cast. When *they follow grass, they are very apt to be over-run with,*

thistles and other weeds; therefore, the weed-hook should be put in use before the noxious plants have time to perfect their seed.

Bean-sowing is another important employment of spring; and this commences the earliest of all. As early as the land can possibly be prepared in spring, even in February, the bean-sowers should be busy. In many places with which the writer is familiar, beans are always planted by means of the dibble in regular lines. In this employment women and children take part, and their operations are very pleasant to witness, being the first general field-work to which they are called in spring. But in other cases, the beans are sown by a small machine, called a bean-drill, which is pushed forward by the workman. A larger drill of the same description is made to sow three rows at once, and is drawn by a horse. Harrowing follows, and when the beans have made some little progress, horse-hoeing, or single-horse ploughing, between the rows, is beneficial to the crop, and increases the fertility of the soil. A bean-field ought to be as nicely kept as a garden, and the frequent hoeings and effectual clearing away of weeds which



DIBBLE.



BEAN-DRILL.

are necessary to this end, leave the ground in very good condition for wheat or barley. After the last hoe-

ing, many farmers drive the double-mould-board plough along the centre of the intervals, so as to lay up the earth as close to the roots of the plants as possible. Some, however, omit this final ridging, as making the ground too uneven for the convenient harvesting of the crop.



BEANS CULTIVATED ON RIDGES.

Turnip-sowing has also to be noticed, and that rather more particularly, on account of the great importance of the crop. The cultivation of turnips as a field crop, has not been general in England during more than half a century, yet how great and important are the changes in our agriculture, produced by its means! In former days it was difficult to manage light soils to advantage: corn crops soon exhausted them, and as no regular succession of green crops was then known, they were unavoidably thrown for a number of years into pasture, until their fertility was restored. It was also difficult to support cattle during winter, when their only provender was hay, so that a large number were slaughtered, and salted down for winter consumption, which might otherwise have added to the more wholesome supply of fresh meat. These, and many other inconveniences were removed by the introduction of *turnip-husbandry*.

The varieties of turnip are commonly known under three divisions, the Swedish, the yellow, and the white. So also there are three times of sowing. Swedish turnips are sown as early as possible, from the beginning of April throughout May, the yellow sorts soon afterwards, and the white at any time from about the middle of May until the end of June, or beginning of July, according to the situation.

Turnip-seed must be chosen with care, for it is frequently adulterated with rape, or with old seed that will not grow. Farmers who are very particular about the quality, save the seed themselves, or purchase of some neighbouring farmer who is accustomed to raise a supply.

The land designed for turnips should be carefully prepared, and plentifully manured. It is broken up in the autumn, immediately after harvest, and left to have all the benefit of the frost, which tends to make it work well in the spring. Repeated ploughings and harrowings are also necessary to bring it into the perfect condition required for this crop, which is the first in most systems of rotation. The manure is put on turnip-land, either by drill, if the seed is to be sown on that plan, or is carted on, laid down in small heaps, which are scattered abroad by women and children, and then ploughed-in.

While the ground is fresh and moist from recent working, the seed is to be deposited, and this is done either broad-cast, or by drill. In some soils and seasons, very heavy crops are produced from broad-cast sowing; but greater certainty of success is attained by drilling. Where the cultivation of this crop is not extensive, a single-row hand drill or barrow may suffice; but the chief implement employed is now a wider drill, drawn by one horse. In a limited number of cases the farmer still puts it in by hand, the implement employed being not unlike a pepper box fastened to the end of a *walking-stick*. A man follows with a rake to cover the *seeds*.

After sowing, the land is lightly rolled, and in about ten days or a fortnight, the young plants begin to appear. If the weather be showery and favourable to their growth, they will come into rough leaf when they are two inches high. Horse-hoeing then commences, and is followed by hand-hoeing, which, to an inexperienced person, would seem to be the total destruction of the crop; for, the labourer going along the side of the drill with a hoe, stands opposite the rows, and with one



HOING TURNIPS.

stroke across the ridge, cuts out the plants at regular distances, leaving so few, that they are hardly distinguishable among their withered companions. But on closer view, we see that plants are left standing singly at regular distances of about nine or ten inches apart, which affords ample space for the growth and increase of the root. In about three weeks' time the weeds will have again made their appearance, and the hand-hoers must accordingly repeat their task, trimming the earth with care round every plant, and cutting away any *sprouts that may have escaped previous notice.*

Another useful crop for feeding sheep is rape, which may be grown on soils that are too stiff for turnips ; but which yields a much less amount of food per acre. Sheep fatten very rapidly on this plant when it is in perfection ; that is, when it has grown freely, and the stems are succulent and not fibrous. In the East Riding of Yorkshire a regular succession of this crop is kept up by sowing it at three different times, from the middle of May to the end of June, and the sheep are put upon it three months after it is sown. It is sown in drills twelve inches apart, but not thinned in the rows, though well hoed between them. Sometimes it is sown broad cast on a fallow, early in June.

Mangel-wurzel is another field crop to be sown in the busy months of April and May. The garden variety of this vegetable (beet-root) has long been known ; but the field crop has not been introduced more than about sixty years. The cultivation is very similar to that of turnips. The seed is small, flat, and light, and is sown either broad-cast, or by dibble. Great care is required in thinning, as the plants are apt to entwine their roots together.

Pease are less universal as a field crop than formerly ; perhaps because they encourage the growth of annual weeds, and thus bring the ground into bad condition. This is partly prevented by sowing them in drills, and hoeing well between the drills in the early period of their growth ; but whatever care may be taken, the trailing habit of the plant will cause it to cover the ground, and thus to shelter weeds to a great extent. Pease and beans are sometimes sown together, the stalks of the latter serving for a support to the former crop. According as they are late or early sorts, pease are sown from February to May, the later varieties being sown in the earlier month.

The potato crop is the last to which we shall allude in this little notice of the sowing season. This crop follows grain, and the stubble lands, if heavy, are

ploughed up for it in the autumn, that the land may be in good condition for the crop. About a month is occupied with the preparation of the ground in spring, from the middle of March to the middle of April. The potatoes being removed from the pit, and prepared in the barn, are planted either whole, or cut into parts called *sets*. A middle-sized potato may be cut into two or three sets, according to the number of eyes it may contain: there ought to be more than one eye in each set, lest that one should fail. As the sets are cut they should be dusted with slaked lime: the juice is thus absorbed, and a paste formed over the sets. Some persons encourage the potatoes to sprout before setting them, by covering them with a thin coating of earth, and watering them. Those which have the healthiest sprouts are then planted, and are said to be at least a fortnight forwarder in their growth than the ordinary crop.

The land being drilled so as to allow the planting to go on without interruption, the sets are placed at convenient distances in the field in sacks, each planter being provided with a basket, into which he puts a portion of the sets as he wants them. Manure is at the same time spread equally in the drills by women, while the planters follow, and put in the sets by dibble.* The operation is finished by the plough, which covers in the manure and the sets as fast as the planting is finished. Thus this important crop, formerly so regular in its returns, but now so difficult and disappointing to the farmer, is consigned to the earth.

The potato being very apt to degenerate, farmers sometimes raise them from the seed contained in the apples which grow upon the stalk. Ripe apples from a healthy plant are for this purpose chosen, and set apart in sand during winter. In April the seed is picked out and sown in rich garden ground, or it is sown in a hot-bed early in March, and planted out in

* See Vignette, p. 31.

May. In October these seedlings will produce tubers, the largest of which are to be gathered and planted out in the following spring, at a few inches' distance from each other. After this, they may be hoed and treated as the old potato. But it takes three years to bring seedlings to maturity; and after all, they sometimes disappoint the expectations of the sower, and differ materially from the crop they were intended to perpetuate.

From what has been already said, it is evident that the round of employments belonging to the farmer's calling is never-ending, and must demand a great amount of diligence, patience, and good judgment, to ensure success. Intervals of leisure are few and far between, and must not be greatly sought after. The yearly toil of agricultural men is well described in the following passage :—

“ When we set out with the husbandman after the conclusion of his harvest labours, which may be aptly styled the commencement of the agricultural year, and follow him as he proceeds through the varied duties of the whole cycle, till we arrive with him at the same point in the following year, from which we had begun in the preceding, we observe that there is a perpetual alternation of employments, by which the amount of labour required upon the farm at each period of the year is pretty nearly equalized. One description of agricultural produce requires a longer union with the soil than another. Wheat, for example, should be sown in autumn. Oats ought not to be committed to the earth till March. Barley must be delayed still longer; while potatoes may be planted in May, and turnips drilled in June. This variety in the periods of seed-time is not more remarkable than that which occurs in those of in-gathering. The first principal crop raised in this country is rye-grass, upon which the *sustenance* of several of the valuable animals reared *and employed* upon the farm mainly depends. Mowing

commences in June; and no sooner has this crop been secured, than the natural hay of the meadows demands the attention of the husbandman. Hard upon this crop follows the ripening of the various descriptions of grain, differing from one another in their periods, and the early and late varieties of each contributing still further to spread the process over a considerable proportion of autumn. The joyous harvest-home closes the year. The distribution of the labours requisite for the cultivation of the soil, however, beautiful as it is, does not so perfectly equalize the exertions of the several seasons so as to afford no periods of relaxation from the regular business of the farm. The arrangement produces only an approximation to this state, and an approximation is all that we require. There are many short seasons intervening, of which the farmer knows well how to take advantage for securing fuel, cutting drains, rearing fences, forming embankments, and superintending other operations, which can be performed during any part of the year, when the duties peculiar to the several seasons cease to require attention. Nor is there wanting to the agricultural labourer a time of innocent relaxation and mirth; for, during the frosts of winter, when the hills and valleys are bound with ice, and the plough can no longer penetrate the surface of the ground, he can lay aside for a little his daily labours, and improve his mind by reading, or exhilarate it by genial intercourse; thus unbending from the rigours of his laborious life, and by a few days of useful or innocent amusement lightening the toil of a whole year.*

* Duncan's "Sacred Philosophy of the Seasons."





“ The Sheepfold here
Pours out its fleecy tenants o’er the glebe.
At first, progressive as a stream, they seek
The middle field; but, scatter’d by degrees,
Each to his choice soon whiten all the land.”

COWPER.

~~~~~

THE life of a shepherd is naturally looked upon as one of peace and contentment. If you go abroad in the early morning, and see him leading forth his bleating flock, his eye brightened with cheerfulness, his cheek ruddy with health: if you hear his clear whistle mingling with the song of the lark, and nearly as joyous; and see with what humble affectionate looks he is followed by *his faithful dog*, you have a picture of country

life that is very pleasant to look upon. And if you join company with the shepherd, and get him to talk about his sheep, you soon find that they are to him as his own family; that he has many a story to tell about them, and that he can point out one and another, and talk of their wanderings, or escapes, or diseases, just as a parent would tell of the illnesses and recovery of his children. He has also many things to say about his dog. Perhaps he will speak of his parentage, and go back to describe the qualities of his race; or he will give you some striking instance of the sagacity of the faithful animal now at his heels; the keen glance of the dog, meanwhile, making you doubt whether he is not conscious of being the subject of your conversation. All this gives you a favourable idea of the shepherd's condition.

If the shepherd's life is not a happy one, it must be his own fault. Brought up to manage sheep from his infancy, he is trusted as a person who understands his work; he knows what that work is; and he is, perhaps, more "his own master" than any other servant on the farm. He spends the greater part of his time in the open air, in healthy and delightful spots; no one interferes with him, or finds fault with him; no one can justly have an ill word to say of him; for a shepherd, when he performs his duty, is a diligent, sober, kind-hearted man, more disposed to make peace than to raise quarrels, and too much taken up with his duties as the manager of a large flock, to join in the bickerings of his more discontented neighbours.

The office of a shepherd is one, which in ancient times was not considered unworthy the most eminent persons. The people of Israel had large flocks and herds, and their principal employment was to tend them. Many of the early patriarchs led a shepherd's life, and David, King of Israel, was taken from the sheepfolds to become *the ruler of a great nation*. The qualities necessary for *a good shepherd* were necessary for *a good king*: he

must lead his flock in the right way; see that their wants are provided for; protect them from their enemies; always desire their welfare, and be ready to expose himself to danger and difficulty for their sake. But the highest honour ever put upon the shepherd's life, was when our Lord and Saviour chose the character of a shepherd to describe his love and pity for mankind, saying, "I am the good Shepherd, and know my sheep, and am known of mine. As the Father knoweth me, even so know I the Father; and I lay down my life for the sheep. And other sheep I have, which are not of this fold: them also I must bring, and they shall hear my voice; and there shall be one fold, and one shepherd." (John x. 14, 15, 16.)

The shepherd's life in this country is a much easier one than in some other parts of the world, where the flocks are obliged to be taken long journeys every spring and autumn, in order to give them shelter and food.

In Spain, where the celebrated Merino flocks are bred, there are ten millions of sheep to be led, twice in the year to a great distance in search of pasture, or of a warmer climate. Forty or fifty thousand shepherds guide these sheep in their wanderings, and travel with them many hundred miles. Those shepherds have a very hard life, compared with ours; but they are so much attached to their flocks that they would not leave them, even if they could get better pay and less work elsewhere. As many as thirty thousand dogs accompany the flocks in their wanderings, and put up with hard fare like their masters. The Spanish shepherds live chiefly on bread seasoned with oil or grease; and though they sometimes procure mutton from their old or diseased sheep, it is not their favourite food. Their dress is a jacket and breeches of black sheep-skin; a red silken sash tied round the waist; long leather gaiters; a slouched hat; a staff with an iron point, and a *manta*, or brown *blanket* slung over the left shoulder. When



they have reached their journey's end, they build themselves rude huts, living generally a single life. Large flocks are managed by several shepherds, and that everything may be done with regularity, one of the most experienced is set over the rest. The times of their wanderings are in May and September, and the whole journey is the same which has been taken for ages. The sheep know the way as well as their masters; and a free passage is granted to them through pastures, villages, &c. where the inhabitants are obliged to leave an opening for them, at least ninety paces wide. The shepherds, on their part, have to lead them as quickly as possible, that they may not do unnecessary damage, and that they may reach certain resting places where they find an open space and good pasture.

In some parts of France the shepherds live a similar life. More than a hundred thousand sheep graze on the plains of Arles in winter; but as the spring approaches, they show the greatest eagerness to set off towards the mountains bordering on Italy; and if not watched, they will escape and be lost. The shepherds set out in May for these mountains, driving their sheep in troops of from ten to forty thousand. To every thousand sheep three shepherds are allowed; each of whom has his dog, and in the middle of the flock a troop of asses carrying baggage. A chief shepherd is chosen, by the general consent of his companions, to direct the march, to deal out the daily share of provisions, and to listen to the complaints of farmers, when damage is done upon the road. The shepherds' dogs are assisted in a remarkable way by goats, in the task of keeping these large flocks in order. The goats are specially trained for the purpose, and have bells round their necks. They are kept in perfect discipline by the shepherds, and show great intelligence in the performance of their task. They halt or proceed by word of command, and at the close of each day's march, they come to the centre of the flock, *and wait there* until the morning, when, having received

their proper orders, they return to their station at the head of the flock with the greatest regularity. On coming to a stream, they halt until the word of command is given, when they plunge into the water, and are followed by the rest of the flock. When the flocks reach the mountains, each shepherd has his proper boundary marked out, and the proprietors of the land are paid about twenty-pence per sheep for their feed during the summer. The shepherds sleep with their flocks in the open air, and live almost entirely on bread and goats' milk.

In the south-west of France, on those wide plains called *Les Landes*, the shepherds lead a very singular life. The country consists of large tracts of deep sand, or of marshy ground, with scanty herbage and prickly shrubs. That they may cross these sands without difficulty, the shepherds fasten stilts, or wooden poles five feet long, to their legs, putting them on and off as regularly as any other part of their dress. When their flocks are grazing, they do not take off these stilts, but remain elevated upon them, that they may the better watch their sheep. The top of the long staff which they use in walking is made broad and round, so that they can sit upon it. Thus seated, they knit stockings all day, and, clad in their rough sheep-skin coats and caps, they have a most singular appearance, looking like so many little watch-towers scattered over the country. The rate at which they can travel on these tall stilts is said to equal that of a trotting horse.

The life of the Australian shepherd is also a laborious one, although his flock does not take such long journeys. Some of the sheep-owners in Australia possess fifteen or twenty thousand sheep, and these are led out to graze before sunrise, and folded or brought back to the sheep-yard at night. The wild dogs of that country are great enemies to the sheep, and will sometimes fall upon them in open day. The shepherd is, therefore, always *on the watch*; and in setting up his fold, he uses

hurdles made of slender rods of iron or oak, seven feet long, and so close together that the lambs cannot escape, nor dogs enter. By the side of this fold he places a moveable, weather-tight hut, in which, with his dogs, he passes the night, keeping a fire burning near the hut to scare away the wild dogs. He has also to watch against a more crafty foe in the escaped convict, whose retreat in the interior of the country is said to be usually well stored with mutton stolen from the different folds.

Nearer home we may also find many dangers connected with the shepherd's life. In the mountain districts of Scotland, both shepherds and sheep are sometimes overwhelmed in violent snow-storms; or if only a small portion of the flock suffers, yet the efforts made by the shepherds to recover them are attended with much danger. It is pleasing to know that in those stormy districts of the north, the shepherds, feeling how entirely their lives are in the hand of the Almighty, are mostly men of piety and prayer, and are remarkable for their simple dependence and trust in God.

The English shepherd has reason to be thankful for a quieter and less dangerous life than many of his fellows; but before we speak of his duties, let us consider awhile the history and habits of the creatures he has to manage.

In many parts of the world wild sheep still exist; and if we wish to know the natural character of the sheep, we must look to them for it, because our flocks are now so completely subdued to the service of men, that they do not give a fair specimen of the natural disposition and habits of the animal. These wild sheep, then, are much more spirited creatures than the sheep we have to deal with. They are provided with horns, from two to six in number, and they know how to use them to the best advantage against an enemy. They also know how to get food and shelter at all seasons. When the snow covers the ground, they scratch it up with their feet, in

order to get at their food ; and when a storm is coming on, they seem quite aware of it, and hasten away to some sheltered spot. They are also more watchful and cunning than our sheep, and have been seen joining in flocks against beasts of prey. Their coats are a mixture



THE ARGALI, OR WILD SHEEP.

of hair and wool, and their horns are frequently of great size. In the mountains of central Asia there is a wild sheep as large as a fallow deer, and more bulky. The male is three feet high at the withers, and sometimes weighs two hundred pounds. This animal has only two horns, but they are of immense size, and nearly four feet long. When shed accidentally, young foxes have been seen to hide themselves in the hollow of these horns. The winter coat of this sheep is a long outer covering of hair, concealing a thick soft layer of wool ; the summer dress is of short hair only. Some writers trace the origin of our domestic sheep to this wild animal, which is called the *Argali*.

When sheep are domesticated, the horns, in many cases, disappear. Some of the most celebrated sheep of the present day are entirely without horns. The animal

also becomes gentle and submissive, and entirely dependent upon man for protection and for food. All domesticated sheep belong to one species; the different *breeds*, as they are called, being varieties produced by difference of situation, food, and climate.

In several countries of the East, and especially in Syria, there is a most extraordinary sheep, whose tail forms one-third of the total weight of the animal. This tail is broad and flattish, and entirely composed of a substance between marrow and fat. This substance is used in kitchens, and as an ingredient in various dishes, and the tails of the finest sheep are therefore taken great care of. Dr. Russel says, that the animals are mostly kept in yards, so as to be in little danger of hurting their tails as they walk about; but in the fields, in order to prevent injury from the bushes, the shepherds in several parts of Syria fix a thin piece of board to the under part of the tail, (which is not, like the rest, covered with wool,) and to this board are added small wheels, "whence, with a little exaggeration, we have the story of the oriental sheep being under the necessity of having carts to carry their tails."

In most cases, there is more hair than wool on wild sheep, and it is one of the happy effects of domestication, that the wool thickens, and the hair disappears. At the Cape of Good Hope, the *native* sheep are covered with strong frizzled hair, which is of little value, except for making cushions and mattresses, and is allowed to drop off of itself; but the skins of these sheep, when cleaned and dressed with the hair on, make handsome and comfortable garments, which are generally worn by the middle and lower classes. The rich affect to despise them, because they say they smell of mutton. Some of the choicest lamb-skins thus prepared are as beautiful as most furs, and when sent to Europe are often mistaken for the skins of some rare animal. Sheep-skins are also used as garments in other countries, where wool, and not hair, is the covering of the animal. In

the fine climate of Persia, flocks form the chief wealth of the people, and produce fine wool, from which are manufactured the celebrated Persian carpets, and also pelisses of sheep-skin, called *posteens*, and made from the finer parts of the skin, with the wool on. The shawls of India, and the cloths and carpets of China, are chiefly manufactured from the fine and long wool of sheep.

In the bleak and barren island of Iceland, sheep are mostly left to find shelter and food for themselves in winter. In the severe snow-storms of that country, they take refuge beneath a jutting rock, or in a mountain cavern; and in their haste to reach these places, being half-blinded with snow, they often fall down the cliffs, and are drowned. If the storm sets in with all its fury before they reach their place of shelter, they huddle together, with their heads to the centre, making a closely packed mass. The snow falls thickly, and soon buries them; but the heat from their bodies causes a vapour to rise through the snow, and this directs the shepherds to the spot, though not always until the sheep are nearly starved, and have begun to feed on each other's wool to preserve life. This habit of gnawing the wool, when once taken, remains with them afterwards, so that, when surrounded with food, they will bite and tear each other's fleeces. These, however, are not very valuable except for making horse-cloths, rugs, and blankets. The Iceland sheep have three, four, or five horns.

The most celebrated sheep of Europe have long been the Spanish sheep, or Merinos; though at the present time the wool of Germany ranks even higher than that of Spain; but this is owing to the improvement of the flocks of Saxony and Prussia, by introducing the Merino sheep among them.

The Spanish sheep are divided into two classes, one of which remains on certain farms or districts, winter and *summer*; the other wanders to a great distance,

under the care of a large body of shepherds, and in the manner already described. Most of the countries of Europe have improved their breeds of sheep by introducing the Merinos amongst them; yet in each case the soil and climate have much to do with the advancement of the flock.

The best breeds of sheep in this country are the *South Downs*, a fine breed inhabiting the whole of the



SOUTH DOWN SHEEP.

upper and under hill grounds of Sussex; the *Cheviots*, extending from Westmoreland, far into Scotland; and the *New Leicesters*, which have now spread to every part of the kingdom. There are various other breeds, either distinct or intermixed with these three principal ones.

*The most approved form in a sheep is general roundness of shape, and fineness of bone. The chest should*

be broad, the ribs well arched, the back and loins broad, flat, and straight; the limbs should be short in proportion to the body, the head small, the ears thin, the skin soft and elastic; the wool soft to the touch, thick, and coming well forward to the face, but not covering it. The face and forehead should be clothed with short hair, and the eyes should have a lively expression.

Such is the appearance of the healthy animal when of the finest breed and make; and it is greatly to be regretted, that while domestication has produced beauty of form and fineness of wool, it has also introduced many diseases unknown to sheep in their wild state. These will be further noticed, with their remedies, when we speak of the shepherd's duties. The flocks least subject to these evils are such as graze in open districts.

The domestic sheep is often spoken of as not only a timid and inoffensive, but a stupid creature. This is scarcely just, considering that much of what is called stupidity, is merely a sort of blind confidence in man, to whom the animal has given itself up for protection and for food. It loses, no doubt, a great deal of its natural cunning and boldness; it becomes timid, easily alarmed, and helpless. When harshly treated, it will tremble and bleat in the most pitiful manner, and will not make the slightest attempt at self-defence. But the sheep is not so stupid an animal as to be without strong feelings and considerable courage, when her young are in danger: nor is she so dull as not to try many arts to get away from the shepherd, if she is set upon wandering to some other pasture. Her bold and determined air when a dog approaches to worry her lambs, is quite a contrast to her usual meek and timid bearing; and the violence of her feelings on losing her lamb, the eager search she makes for it, her continual bleating, and distracted looks, all shew how strong her affections are. If her offspring *dies*, she keeps watch over its remains with



affecting constancy. The Ettrick Shepherd tells the history of a ewe who had lost her lamb in a very severe spring, when several scores had been destroyed at the same time. "Faithfully did she stand to her charge. I visited her every morning and every evening for the first eight days, and never found her above two or three yards from her lamb; and often as I went my rounds, she eyed me long ere I came near her, and kept stamping with her foot, and whistling through her nose, to frighten away the dog. He got a regular chase twice a day as I passed by; but however excited and fierce a ewe may be, she never offers any resistance to mankind, being perfectly and meekly passive to them. The weather grew fine and warm, and the dead lamb soon decayed; but still this affectionate and desolate creature kept hanging over the poor remains, with an attachment that seemed to be nourished by hopelessness. It often drew the tears from my eyes to see her hanging with such fondness over a few bones and a bit of wool. For the first fortnight she never quitted the spot, and for another week she visited it every morning and evening, uttering a few kindly and heart-piercing bleats, till at length every remnant of her offspring vanished, mixing with the soil, or wafted away by the winds."

The sheep becomes attached to its native pastures with a feeling akin to the love of home amongst mankind, and will often perform long journeys alone until it reaches the familiar spot. Several instances have been related of the perseverance with which this animal will watch for an opportunity of escaping from a strange place, and will find its way back again to the accustomed pastures. One of the most surprising is told by the Ettrick Shepherd, of a black ewe that returned with her lamb from a farm in the head of Glen Lyon, to the farm of Harehope in Tweed-dale, and accomplished the journey in nine days. She was soon missed by her owner, and a shepherd was despatched in pursuit of her, who followed her to Crieff, where he turned and

gave her up. He got intelligence of her all the way, and every one told him that she absolutely persisted in travelling on. She would not be turned, regarding neither sheep nor shepherd by the way. Her lamb was often far behind, and she had constantly to urge it on by impatient bleating. She unluckily came to Stirling on the morning of a great annual fair, about the end of May; and judging it imprudent to venture through the crowd with her lamb, she halted on the north side of the town the whole day, where she was seen by hundreds lying close by the road-side. But next morning, when all became quiet, a little after the break of day, she was observed stealing quietly through the town, in apparent terror of the dogs that were prowling about the streets. The last time she was seen on the road was at a toll-bar, near St. Ninians; the man stopped her, thinking she was a strayed animal, and that some one would claim her. She tried several times to break through by force when he opened the gate, but he always prevented her; and at length she turned patiently back. She had found some means of eluding him, however, for home she came on a Sabbath morning the 4th of June; and she left Lock's farm, in Glen Lyon, either on the Thursday afternoon, or Friday morning, a week and two days before. The farmer of Harehope paid the Highland farmer the price of her, and she remained on her native farm till she died of old age, in her seventeenth year.

Sheep also take pleasure in musical sounds; and some people even say that they feed better and fatten sooner when listening to the shepherd's pipe. Without going so far as this, we must allow that either curiosity or pleasure makes them very attentive to a tune that may be played to them. Of this a striking instance is given in the Life of Haydn. Describing a day among the mountains of Lombardy, where he and his friends met with a large flock of sheep going to their pasture, he says, "*One of our party, who was no bad performer on*

the flute, and who always carried his instrument along with him, took it out of his pocket. 'I am going,' said he, 'to turn Corydon; let us see whether Virgil's sheep will recognise their pastor.' He began to play. The sheep and goats, which were following one another towards the mountain, with their heads hanging down, raised them at the first sound of the flute, and all, with a general and hasty movement, turned to the side from whence the agreeable sound proceeded. Gradually they flocked round the musician, and listened with motionless attention. He ceased playing: still the sheep did not stir. The shepherd with his staff obliged those nearest to him to move on. They obeyed; but no sooner did the fluter begin to play, than his innocent auditors again returned to him. The shepherd, out of patience, pelted them with clods of earth; but not one would move. The fluter played with additional skill; the shepherd fell into a passion, whistled, scolded, and pelted the poor fleecy amateurs with stones. Such as were hit by them began to march, but the others still refused to stir. At last the shepherd was obliged to entreat our Orpheus to stop his magic sounds; the sheep then moved off, but continued to stop at a distance, as often as our friend resumed the agreeable instrument. The tune he played was nothing more than the favourite air of the opera then performing at Milan. As music was our continual employment, we were delighted with our adventure; we reasoned upon it the whole day, and concluded that physical pleasure is the basis of all music."

Among the Pyrenees, sheep obey the call of the shepherd in a way that shews their docile and obedient nature, and also beautifully illustrates what is said in the Scriptures of the good Shepherd: "He goeth before them, and the sheep follow him, for they know his voice." If the sheep are at no great distance from the shepherd, he whistles to them, and they leave off feeding, and obey his call; if they are far off and scattered,

he utters a shrill cry, and instantly the flock are seen leaping down the rocks, and scampering towards him. Having waited until they have mustered round him, the shepherd then sets off on his return to his cabin or resting-place, his flock following behind like so many well-trained hounds. There is no such sight among these mountains as driving the sheep by means of dogs: these faithful animals guard the flock from the attacks of wolves and bears; but they are never seen chasing the sheep or biting the legs of stragglers.

Allowing, then, that sheep have feeling and instinct sufficient to prevent our charging them with stupidity, let us trace the shepherd's task in the management of these harmless creatures from their birth.

" Say, ye that know, ye who have felt and seen  
Spring's morning smiles, and soul-enlivening green,  
Say, did you give the thrilling transport way?  
Did your eye brighten when young lambs at play  
Leap'd o'er your path with animated pride,  
Or gazed in merry clusters by your side?

A few begin a short but vigorous race,  
And indolence abashed soon flies the place.  
Thus challenged forth, see thither, one by one,  
From every side assembling playmates run;  
A thousand wily antics mark their stay,  
A starting crowd impatient of delay.  
Like the fond dove, from fearful prison freed,  
Each seems to say, ' Come let us try our speed;'  
Away they scour, impetuous, ardent, strong,  
The green turf trembling as they bound along;  
Adown the slope, then up the hillock climb,  
Where every mole-hill is a bed of thyme;  
There panting stop, yet scarcely can refrain;  
A bird, a leaf, will set them off again:  
Or if a gale with strength unusual blow,  
Scattering the wild-briar roses into snow,  
Their little limbs increasing efforts try,  
Like the torn flower the fair assemblage fly."

The frolics of young lambs are indeed a gladsome sight to the shepherd as well as to others, for they

bespeak the healthy condition of his charge. The lambing season is in February and March, and is an anxious time for all who are concerned with flocks ; the shepherd has to be on the alert night and day. The lambs, when born, are sometimes nearly lifeless, and without the care of the shepherd would certainly perish. Either they are so weak that they cannot stand up to suck, or they are so little alive that the greatest care is necessary to restore animation. In these cases the shepherd takes the ewe with her young to a place of shelter, where they can be attended to, or he puts the half-dead lamb into a basket with some wool, and keeps it near his cottage fire, where his wife takes care of it, and now and then pours a little warm milk down its throat.

When the ewes have twins, they are well supplied with food, that they may be able to support this double charge. But it often happens that the ewe beats off one of the lambs, as if conscious that she could not support both ; and if the shepherd cannot reconcile the mother to her offspring, he has to seek elsewhere for the means of nourishing the poor little outcast. He therefore takes it to some desolate mother who has lost her lamb, and who is, perhaps, piteously bleating over the dead body. But he cannot prevail upon her to receive the stranger without employing a little deception. Taking away the carcass of the dead lamb, he strips off the skin, and fits it as well as he can to the body of the living one. A strange figure does the little stranger cut, thus dressed up in another's fleece : but if taken in the twilight to the mourning ewe, she smells the skin of her own offspring, and welcomes the wearer of it with delight. The little starving creature gladly takes to her as its mother, and when daylight comes she does not cast it off, but loads it with caresses and marks of affection ; although to other eyes the cheat is plain enough, for the false skin hangs loosely about, and those parts which covered the legs flap up and down as the lamb runs about the pasture. In a few days the skin is removed, without

altering the feelings of the supposed parent. This method of cheating the ewe into the adoption of a strange lamb has been thus poetically described :—

“ Her tender offspring dead, the dam aloud  
 Calls, and runs wild amidst th’ unconscious crowd ;  
 And orphan’d sucklings raise the piteous cry—  
 No wool to warm them, no defenders nigh.  
 And must her streaming milk then flow in vain ?  
 Must unregarded innocence complain ?  
 No ;—ere this strong solicitude subside,  
 Maternal fondness may be fresh applied,  
 And the adopted stripling still may find  
 A parent most assiduously kind.  
 For this he ’s doomed awhile disguised to range  
 (For fraud or force must work the wished-for change),  
 For this his predecessor’s skin he wears,  
 Till, cheated into tenderness and cares,  
 The unsuspecting dam, contented grown,  
 Cherish and guard the fondling as her own.”

So many are the casualties of the lambing season, that, although many of the ewes have twins, it is looked upon as a favourable season when one lamb can be reared for every ewe of the flock. The lambs remain with the ewes until the weaning time, which is generally about the middle of July. They are then separated and kept out of hearing of each other, that they may not be disturbed by mutual bleatings. The ewes require to be milked three or four times after the lambs are taken away. The pasture into which the lambs are turned at the weaning time should be fresh and sweet, but not too rank.

The natural food of sheep is herbage, upon which they feed during summer. The short sweet grass of downs is safer food than the rich grass of valleys, and is better suited to the general habits of sheep, who are fond of grazing on breezy heights. As spring advances, the fleeces of the flock shew tokens of the approach of shearing time, for a new coat of wool sprouts up, and begins to lift the old from the skin. The usual time for sheep-shearing is the middle of June ; but the coldness or

warmth of the weather must be considered. It is cruel to shear sheep too early in the season, and it is a bad practice to delay it too long. A few days or a week before shearing, the flock is washed in a running stream, where the soil is hard and gravelly. A muddy river



SHEEP-WASHING.

would do more harm than good. Folds are set up on either side of this stream, one for the washed, the other for the unwashed.

The shepherd and two or three assistants generally manage the sheep-washing, the number depending upon the size of the flock ; but the most complete way of doing it is as follows :—While one or two persons are employed in catching the sheep, and bringing them one by one to the river's brink, three men stand in the water: the first near the bank where the sheep are folded ; the second in the middle of the stream, but rather higher *up than the first* ; the third near the opposite bank, and

still higher than the second. The first takes the struggling sheep, and holds it under water, except the head, waving it to and fro, and taking care that the wool shall be well soaked. The fleece is generally in such a dirty state that the water round this man soon becomes muddy, but clears itself again. The sheep is then handed to the middle man, who repeats the process in his purer part of the stream. At last it is given over to the third man, who is, perhaps, the shepherd, and who well rubs the fleece, and feels if the skin is clean. He gives it a last dip, and allows it to go ashore on the grassy bank, where, at first, it is scarcely able to stand under the weight of the wet wool; but soon relieves itself, by shaking out a shower of moisture. It is the duty of the helpers to supply the washers regularly with sheep, so that no time may be lost.

The shepherd's crook is not so universal as formerly, but it is a useful implement in catching sheep. It consists of a round rod of iron, bent in the form represented in vignette at the head of this chapter, and furnished at one end with a knob, that the animal may not be injured by a sharp point, and at the other end with a socket, into which a shaft of wood, five or six feet long, is fitted. The hind leg of the sheep is caught by the hook, and, slipping along the narrow part, is held by the loop at the end. Some caution is required in using this implement, for the sheep occasionally starts away with such violence, immediately on feeling the crook, as to risk laming, or otherwise injuring itself. On first embracing the leg, the crook should be drawn quickly towards the shepherd, so as to bring the bend of the loop against the leg, as high up as the hock, before the sheep has time to break off. The animal can then be easily secured by hand.

From the time of washing to that of shearing it is necessary to keep the sheep in a dry clean place, that their fleeces may not become soiled. Sufficient time must be *allowed for the fleece to get in good condition*



for shearing, which is not until the "yolk" is come into it again; the natural oil of the skin is thus called by farmers, and this improves the fleece greatly, making it soft and elastic. The heat or coolness of the weather will likewise shorten or lengthen the time between washing and shearing.



SHEEP-SHEARING.

The shearing place is usually a barn. It is a pretty sight when sheep are sheared on the grass; but this is not often done with safety in a climate like ours. A shower of rain, or a heavy fall of dew, may destroy the fine condition of the fleece. It is true that the barn-floor is a hard place for the kneeling shearers, as well as for the sheep; but, in order to remedy this, it is sometimes prepared for the purpose by laying down some

lean wheat straw, and then stretching the canvass barn-sheet over, and nailing it down. This makes a sort of cushion for the convenience of the shearers, and also helps to keep the fleece clean, which is of great consequence. A sufficient number of sheep for the day's shearing have, perhaps, been kept under cover all night, that their fleeces may be in good order; and early in the morning the shearers begin their task.

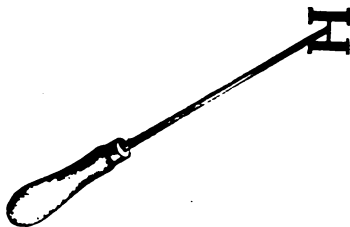
The hoofs and coats of the sheep being examined, and all dirt removed, the animal is pulled back on its haunches, and the shearer, falling on one knee, proceeds to remove the short wool on the under parts of the body, beginning at the throat. For this he uses clipping-shears, the bend of which acts as a spring to keep the blades apart. There is some art in using this simple instrument, so as to avoid cutting the animal; and young beginners often make sad wounds in the sheep by not keeping the points clear of the skin.

In some places the wool is cut lengthways, in others it is cut round the body; the latter is the most general plan. The wool of the under part of the sheep is therefore cut regularly across from side to side, and when this is completed, the animal is turned *gently* over upon its side.

The shearer now falls on both knees, supporting the houlders of the sheep against them, and leaving the animal as much at ease as possible. In this position he clips the wool from the head, and back of the neck, and on down the side of the animal to the tail. Then, turning the sheep on its clipped side, he does the same for the other side, gently holding down the head of the animal by placing his legs across the neck. He soon frees the sheep from its fleece, and allows it to scramble on its feet, taking care, however, that it does not get entangled in the wool, and tear it. It is then marked with the owner's name, with an iron dipped in a mixture of lamp black, tallow, and tar.

There are various ways of holding the sheep during

the shearing, in different parts of the country; but however held, it should be done with the least possible distress to the patient animal, whose perfect quietness



MARKING-IRON.

under the hands of the shearer has furnished the subject of one of the most affecting texts of Scripture. (See Isa. liii. 7.)

No sooner does the animal find itself at liberty, than it hastens to join its fellows in some enclosure outside the barn; and it is amusing to see the strangeness and unsteadiness of its gait, after the loss of the heavy fleece. The meeting of the ewes and lambs after the mothers have lost their fleeces is also an interesting sight. The loud bleatings of the lambs express their surprise at the changed appearance of the ewes, and the latter not less loudly express their feelings on the occasion. It is doubtful whether the lambs would be able to recognise their mothers did not the ewes seek them out, and call them, as it were, by name; for you may easily imagine a language between parent and child, if you listen to the different tones in which each ewe addresses her offspring; one apparently using the language of affection, another the trembling tones of anxiety, and a third, the gruff voice of reproof.

To return to the barn:—The fleeces, as fast as they are taken from the sheep, are laid singly and unbroken upon a board. They are there examined; and any

umps of dirt, thorns, straw, &c. picked off. Each fleece is then rolled up tightly, the sides being turned in, and the roll made from the tail to the neck, where a lock of wool is pulled out to a sufficient length, to wind round and fasten the fleece. If not well examined, bits of dirt, &c. are apt to be rolled up in the fleece, and the buyer justly complains, for these things add to the weight.

In former years, when the demand for mutton was not so great as at present, sheep were seldom killed before five or six years old, their fleeces being the chief object with the farmer. This is still the case in many countries; but with ourselves, it is much altered. Sheep are now so quickly fattened by means of the turnip husbandry, and so much improved in general, that they are brought to market within two years or two and a half. Nevertheless it has been said, that this hastening of the maturity of sheep "converts the food into fat, and gives nothing to gravy." The natural age of the sheep is about nine or ten years, but in the sixth year the teeth begin to fail, and the animal, unable to masticate its food properly, soon loses flesh. The sheep's age is commonly reckoned from the first shearing—not from the birth. It may be known by examining the fore-teeth of the lower jaw, of which they have eight, the upper jaw being without any in front. For the first year these teeth are very small; but in the second year the first two are renewed, and two more every year until the fourth, when they are what is called "full-mouthed." Young sheep are considered fit for the market soon after their first shearing, that is, when they are one year and three months old. But if not in good condition at that time, they are kept upon the farm until they have yielded one more fleece, and are sold in the following spring.

Throughout the summer, the pastures yield the chief supply of food to the flocks, but towards the end of October, or beginning of November, these begin to fail;

and then it is that the great importance of the turnip crop is felt. About a century ago turnips were only cultivated in England on a small scale; but since then they have spread to every part of the kingdom, and wonderful has been the improvement in our flocks in



THE BLACK CATERPILLAR.

consequence. The turnip crop is subject to many enemies. One of these is the turnip-beetle, commonly called the "fly," a small black shining insect, with wings *twice as long* as the body; living under the bark of *trees*, or in the chinks of old palings all the winter, and

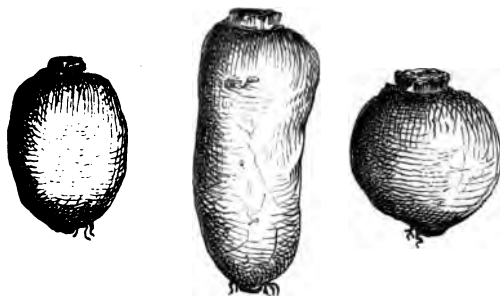
coming out in the spring to make fatal attacks on different vegetables, but especially the turnip, by laying its eggs on the under sides of the leaves, from which, in ten days time, there come out little caterpillars, which destroy the young smooth leaves and the heart of the plant, piercing it full of holes like a sieve. Another is the black caterpillar, which comes from a small orange-coloured fly, called the turnip saw-fly, and which also feeds on the leaves of turnips, but at a later season, and when the plants are in full vigour. This destructive caterpillar completely devours the leaves, and destroys the health of the root, doing great havoc in a short time. It is full grown in three weeks' time, and soon afterwards it buries itself in the earth, and forms a cocoon, in which it changes to the chrysalis state.



COCOON AND CHRYSALIS OF THE BLACK CATERPILLAR.

When the turnip crop is good, it forms a valuable resource for the sheep in autumn. Turnips are either taken to the ground where they feed, or the sheep are penned on certain portions of the turnip field, and allowed to help themselves. Great care is necessary in first putting sheep upon this new food; for they enjoy the freshness and sweetness of the turnips so much as not to know when they have had enough, and so do themselves mischief. It is the shepherd's duty to set up the fold, and this he generally does by inclosing a space that will give them food enough for a week; but he sometimes makes the fold smaller than this at first, preferring the trouble of changing it every two or three days to the risk of over-feeding his sheep. When the turnips and the ground are in a wet state through rain or dew, he does not turn them in early in the day

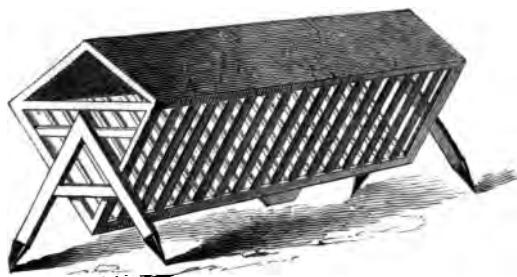
but allows time for the food to become dry. He is careful not to allow the sheep to remain by night upon the turnip ground, unless it is in a tolerably dry state, or has been trodden hard by their tramlings.



VARIOUS FORMS OF TURNIP.

The most fatal diseases of sheep arise from their lying on wet ground. When the sheep have eaten down the turnips close to the ground, and have scooped them out as much as they can, a small hoe, called a turnip-picker, is used to get up the remainder of the root. Sometimes a sort of double hoe is used, or one in which the blade divides into two forks, between which the tap-root of the turnip is caught, and brought up entire; but the plain hoe, which cuts off the tap-root, is preferred; because that part of the turnip is hard and unwholesome, and is better left to rot in the ground than pulled up for the sheep. Dry food is always given to sheep while they are on turnips, that they may not be injured by their juicy diet. Sheep fed on both hay and turnips thrive better than when fed on either alone. The hay is given to them in racks, of which the best have a roof of boards to throw off the rain, and are also supported on tressels shod with iron. A lid opens in the roof for convenience of putting in the fodder. These racks not only keep the hay dry and clean, and prevent waste, but they

afford considerable shelter and warmth to the sheep, who will often be found lying down on the side which best keeps off the wind and rain. It is the shepherd's task to carry a supply of hay for these racks every day when



HAY-RACK.

he visits the sheep. He will also do well to allow them a certain quantity of salt daily. The great benefit of salt to cattle is now beginning to be understood, and to sheep in particular it is of the utmost consequence, for it is found to check one of their worst diseases, called the *rot*. The eagerness these animals show in seeking out and waiting for their supply of salt, when they have reason to expect it, is a plain proof that it is a welcome addition to their meal. Let us suppose ourselves seated at dinner with no salt at the table, and if we could not enjoy our meal without it, why should not the sheep feel disrelish for unsalted food when once accustomed to the flavour of that wholesome substance? If lumps of salt are laid on flat stones in different parts of the fold, we shall soon see the sheep gathered round in clusters, eagerly licking the salt. In the mountains of Switzerland, even on the borders of perpetual snow, a few sheep pasture every year with only an occasional visit from their shepherd, who brings them salt at stated



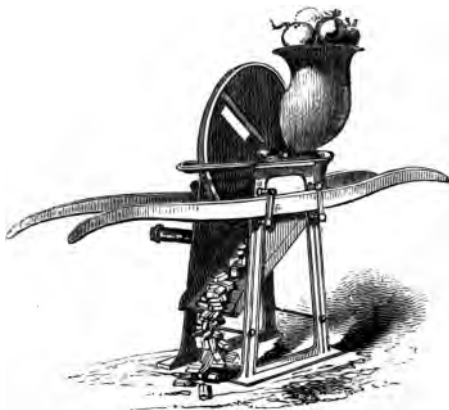
times. A traveller is sometimes inconvenienced by these sheep crowding round him and following him, under the idea that he has brought salt with him.

On many of our farms the plan is now adopted of putting troughs, filled with sliced turnips, in different



TURNIP-TROUGH.

parts of the ground where the sheep are feeding. For this purpose a very useful machine, called a turnip-slicer, is conveyed to the spot, some of the turnips are



TURNIP-SLICER.

pulled up, trimmed, and put into the hopper. They are quickly cut in small slices, and with these the different

troughs are filled direct from the machine. There are now several forms of turnip-cutters in use. Our figure represents an improved machine by Baird. It is made of cast-iron, and consists of a frame with hopper attached. On the frame is mounted a circular plate of cast-iron upon a horizontal axis, to which the winch-handle is attached. The plate has a thickened edge or rim of iron, which gives it, when in motion, the effect of a fly-wheel. It carries two thin cutters or knives. The thickness of the slices is regulated by the distance of these knives from the face of the plate. Each knife is preceded by three or more lancet-pointed studs, which, by slitting the turnips in passing, prepare the slices for falling in pieces when they are detached from the knives at each turn of the plate. This goes on as long as the hopper is filled with turnips, their own weight being found sufficient to hold them in the stroke of the knife. Many persons consider iron machines too heavy, and continue to use the old form, which is of wood.

This plan of giving sliced turnips is an economical one, and turns the food to the best account. There must be some waste when the sheep are left to scoop out the turnips as they please, and to tread under foot a portion of their food; and yet, there is much advantage to the soil in folding sheep on turnip-fields. By slicing the turnips on the spot, both ends are answered. The ground is enriched by the manure of the sheep, and the food is turned to the best account.

In folding sheep on turnips, the shepherd uses either hurdles or nets. Hurdles are the most common, but nets, when well managed, are less expensive, and are more easily moved from place to place. The nets are made of strong twine, and through the upper and lower meshes a rope is passed, which is wound round young ash or oak stakes driven into the ground at intervals. The wood for these stakes is seasoned with the bark on, and is driven in with the root end downwards, being found to last better when so put in. The distance of

the stakes one from another is about three paces, and the shepherd drives them in with a mallet, generally made of the wood of the apple-tree, because it is not liable to



THE SHEPHERD'S MALLET.

split. The tops of all the stakes must stand at an equal height of four feet, and when all are driven in, the shepherd takes a net rolled up in a bundle, and fastening the top and bottom ropes to the first stake, he unrolls the bundle as he goes to the second stake, keeping inside the intended fold. He fastens the rope to the

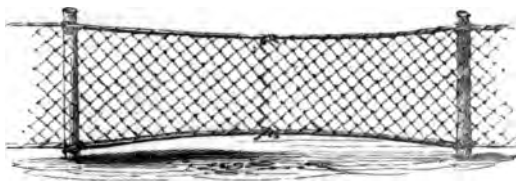


THE SHEPHERD'S KNOT.

second, and to all the succeeding stakes, by what is called the shepherd's knot, making the bottom one fast at three inches from the ground, and the other nearly at the top of the stake, and at the same time stretching the net evenly. In this way he goes from stake to stake until the whole is set up. When one length of net is used up, he takes another and laces the meshes of the two nets together with a piece of string.

The cheapness and convenience of nets would no doubt bring them into general use, were it not for the care required to keep them in order. If they are put up in a damp state, and the weather be dry, they will slacken so much in drying as to hang in bags, or slip down the stakes; and if, on the other hand, the ropes and twine be properly dried, and damp weather follow upon setting up the fold, unless allowance is made for

it, the ropes and twine will become so much tightened by the moisture as to be in danger of bursting. Where net folds are used, the shepherd always takes care to



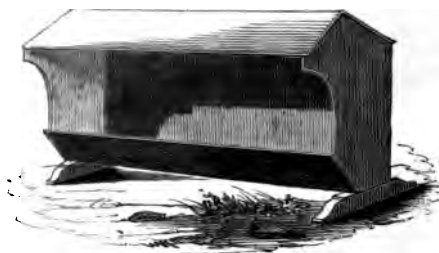
FOLD-NET.

carry about some twine, with which he mends holes. The common fold, made of hurdles, is not therefore likely to be set aside. Besides the temporary fold used in turnip feeding, there are others consisting of houses or sheds attached to the farm-yard, for the protection of the sheep in bad weather.

Should the turnip crop fail, several other kinds of food may be given to sheep; such as potatoes, mangel-wurzel, cabbages, and rape: also, in case of need, corn in the sheaf, brewers' grains, and oil cake. But there is no real substitute for turnips, the most valuable crop for the sheep farmer.

The shepherd has to watch the effect of diet on his flock, and to observe the first tokens of disease. A rich and moist diet, and a damp soil, will often produce symptoms of the rot, a disease which can only be cured when taken in the earliest stage. Unless the shepherd is very watchful of the appearance of his flock, this disease may have been going on amongst them for some time without his noticing it. The infected sheep are a little duller than usual; but they do not at first lose their appetites, nor become thin. The sure sign of this complaint is, however, the yellow colour of the eye around the pupil, and the appearance of a yellow fluid *at the corner of the eye*. Where this is observed, an

immediate change to a dry pasture, and the unlimited use of salt, are the only means that afford the least chance of recovery, and this chance is but small. It has been said that if sheep were always well supplied with salt, we should hear very little of this fatal disease;



FEEDING-BOX.

however this may be, it has been proved, in more than one instance, that salt is an excellent remedy, for the greater part of an infected flock were recovered by the free use of it.

This dreaded complaint is an inflammation of the liver, much more common in sheep than in other animals, and having a very evident connexion with their pastures. We read that the sheep of Egypt are very subject to this disease after the overflowing of the river Nile. The grass springs up rapidly, and the sheep fatten at an astonishing rate, but soon show tokens of the rot. Their shepherds immediately drive them back into the desert, where, on dry food and amongst the sands, they frequently recover. On some of our farms there are particular fields which will give the rot to whatever sheep are turned into them, and these are generally damp and marshy spots much in need of *drainage*; and the expense of draining the land would *be well repaid* in a short time if healthy food was raised

for these valuable animals. But even drainage may be carried to excess. In some districts of the north where this was the case, and where little nourishment was left in the pastures, an opposite disease began to show itself, called *pining*, from the gradual decline of the flocks. This is, however, much less common than the rot.

The fevers and other inflammatory diseases of sheep are becoming more rare, as the treatment of the animal is better understood. Many complaints which arose from bad food are now seldom heard of. There are still remaining some troublesome diseases of the skin, which are also very infectious. The shepherd soon observes the tokens of these diseases in the restlessness of his flock, and their disposition to rub and tear their wool. He therefore mixes one part of mercurial ointment with seven parts of lard, and rubs it into the parts affected. A very common and infectious disorder is the *foot-rot*, a sort of ulcer forming on the foot. The present way of treating it is, to pare away the loose horn, to wash the foot in chloride of lime, and to touch it lightly with muriate of antimony, repeating this every day until the whole foot is covered with new horn. The affected sheep must be kept separate from the rest, or the complaint will soon spread through the whole flock. It is even said that healthy sheep going into a field where diseased sheep have trod, will take the foot-rot from the soil.

In the months of July and August our flocks are continually teased and worried by the flesh-fly, and the shepherd has to watch them narrowly to prevent mischief. These flies lay their eggs in clusters on any unprotected part of the skin, and if they are not taken off, they become, in twenty-four hours' time, a mass of living and active maggots, ready to pierce the skin, and eat into the flesh of the sheep. Sheep that are suffering from some disease, or whose skin has been accidentally torn or injured, are the first to be attacked by the fly. *There are several means of stopping this evil, the most*

common being to smear the part affected with tar, or with weak mercurial ointment; but most of the usual remedies are more or less injurious to the wool, and must be used with caution. In some places, sheep are regularly smeared with a mixture of tar and butter before winter, which destroys vermin, and protects from cold, but hurts the wool: or they are, at an earlier season, dipped in a bath filled with a poisonous mixture, which appears to prevent the attacks of flies and vermin. This is usually done in July. Persons accustomed to the task, dip the sheep one by one in this bath, taking care to keep the head above the surface.

There are many other diseases of sheep well known to shepherds, but which, under their watchful care, are frequently subdued or prevented. The shepherd should be a man well trained from early childhood to look after sheep; his office is one of great trust, and he may save or lose large sums for his master according as he takes care of, or neglects, the valuable animals under his charge. As we see him watching his flock, we are apt to think he has not much to do; but a good shepherd, with a large flock constantly under his care, is never idle. From early dawn to evening, he is in attendance upon them, or providing for their wants. He walks to great distances, has much fatigue and loss of rest in the lambing season, and shares all the labours connected with washing, shearing, marking, dipping, smearing, &c. He is also the physician of the flock, and keeps his medicines and remedies ready to be administered at a moment's notice. But his greatest value to his master is in his constant looking after the whole flock, so that no one shall escape his notice. In Winter—

“Deep goes the frost, till every root is found  
A rolling mass of ice upon the ground;  
No tender ewe can break her nightly fast,  
Nor heifer strong begin the cold repast,  
Till Giles, with pond'rous beetle, foremost go,  
And scatt'ring splinters fly at every blow;



When pressing round him, eager for the prize,  
From their mixt breath warm exhalations rise."

The shepherd's ears are attentive to the hoarse cough, and his eyes open to the heavy look or the limping gait of any one of his sheep. He knows when to give or withhold certain kinds of food; and how to avoid most of the evils to which his flock is subject. He can also judge of the degree of warmth and shelter they may best receive in severe weather, without making them tender and susceptible of cold. In fact, he treats his sheep with gentle and considerate kindness, studies their comfort before his own, and is almost as anxious about them, as if they were his children.

His dog is the only companion the shepherd needs in these duties. The shepherd's dog possesses much of the same form and character in every country. The muzzle is sharp, the ears are short and erect, and the body is covered with *thick shaggy hair*; the tail is long, slightly



turned upwards, and bushy like that of the fox; the colour of the animal is black, more or less mixed with grey or brown. When well trained, this animal is the most tractable and obedient of creatures. A very good judge of rural affairs has said, that the temper of a shepherd may soon be discovered by that of his dog: "When you observe an aged dog making a great noise, bustling about in an impatient manner, running fiercely at a sheep and turning him quickly, biting at his ears and legs, you may conclude, without hesitation, that the shepherd who owns him is a man of hasty temper. Most young dogs exhibit these characteristics naturally, and they generally over-do their work; and if you observe a shepherd allowing a young dog to take his own way, you may conclude that he also is a man who loses his temper with his flock. If you observe another shepherd allowing his dog, whether old or young, to take a range along the fences of a field, driving the sheep within his sight as if to gather them, you may be sure he is a lazy fellow—more ready to make his dog bring the sheep to him, than to walk his rounds amongst them. Great harm may accrue to sheep by working dogs in these ways."\*

This sensible writer goes on to show the effect of allowing the dogs to worry the sheep; how it takes them off their food, and makes them run to the farthest corners of the field as soon as they hear the voice of the dreaded animal; how it overheats the lambs, and is often the cause of serious injury to the ewes; how much more liable sheep, so worried, are to break loose, and give trouble to the shepherd, than such as are treated in a gentle manner. He then gives an admirable picture of a shepherd and dog each fulfilling his proper duty, which we thus abridge for the benefit of the reader. A temperate shepherd never disturbs his sheep when he takes his rounds amongst them at morning, noon, and night; his dog following at his feet as if he

\* Stephens.

had nothing to do, but ready to fulfil any service at a moment's notice. If sheep are to be gathered for the purpose of sorting, or catching some, the shepherd gathers them at a corner which they can reach with the least trouble, sending his dog to right and left to cause the sheep to march quietly to the spot. After they are gathered, he makes the dog understand that it is his duty to prevent any of the sheep breaking away; but if one does escape, and has to be turned, he does not allow the dog to bite it, but only to bark and give a bound at its head. A temperate shepherd only lets his dog work when his services are actually required: he fulfils his own duties faithfully, and only receives help from his dog when the matter cannot be so well done by himself. The dog, on his part, when properly trained, becomes very sagacious: he will visit every part of a field where sheep are most apt to stray, and where they are most in danger, such as a weak part of the fence, a deep ditch, or a hollow, where sheep may possibly fall, and be unable to rise. When the dog finds a sheep in this condition, he helps to raise it by seizing the wool on one side, and pulling the animal over upon its feet. Experienced dogs well know when foxes are abroad, and show the greatest uneasiness when they come near the lambing-fold. They also hear the footsteps of strange persons at night at a great distance, and though showing evident signs of displeasure, they have too much sagacity to bark or growl, and thus to betray their own presence too soon. The shepherd's dog is so incorruptible, that he cannot be bribed, nor will he suffer even a known friend to touch him when entrusted with any piece of duty. As a puppy, the shepherd's dog has a natural tendency to work the sheep, but he improves, and learns to check his ardent temper when trained with an old dog. He watches the sober and temperate conduct of his companion, and after a time learns to imitate it. A well-trained shepherd's dog is indeed a most valuable animal, and well worthy the regard and estimation in

which he is generally held. One or two instances of his sagacity will form our conclusion to this little sketch of the transactions of the FOLD.

A sheep-stealer possessing one of these faithful dogs, employed him unworthily to further his own purposes. Under pretence of looking at sheep with an intention to purchase them, he went over the grounds, accompanied by his dog, to whom he secretly gave a signal so as to let him know the individuals he wanted, to the number perhaps of ten or twenty, out of a flock of some hundreds; he then went away, and from the distance of several miles sent back the dog by himself in the night time, who picked out the individual sheep, separated them from the rest, and drove them before him the distance of ten or twelve miles till he came up with his master.

A Kentish farmer returning from market somewhat intoxicated, fell from his horse among the snow in one of the coldest nights ever known. A dog of this kind, who was following his master, rolled himself round, and lay down upon the farmer's breast, in which state the pair were found by a gentleman, who went out early the next morning to shoot wild fowl. The farmer appeared quite lifeless; but on administering the proper remedies he gradually recovered, and justly felt that he owed his life to the animal, who had preserved warmth in the vital parts of his body, by thus spreading over them his own shaggy coat.

A butcher and cattle dealer, living nine miles from Alston, in Cumberland, was accustomed to drive sheep and oxen to Alston market, and was often surprised at the sagacity of his dog, and the cleverness with which he managed the cattle. At length he took very little trouble about the matter himself, but rode carelessly along, amusing himself with the way in which the dog acquitted himself of his charge. So convinced was he of the trustworthiness of this faithful servant, that at last he laid a wager that the dog should drive a certain

number of sheep and oxen alone, and unattended, to Alston market. No person was to be within sight or hearing, who had the least control over the dog; nor was any spectator to interfere, nor be within five hundred yards. On trial, this extraordinary animal proceeded to business in the most steady and dexterous manner; and although he had frequently to drive his charge through other herds which were grazing, yet he never lost one, but conducted them safely to the very yard where he had been accustomed to drive them with his master, and delivered them up to the person appointed to receive them, by significantly barking at his door. What was very remarkable in this journey was, that when the path lay through a spot where other herds were grazing, the dog would run forward, stop his own drove, and then, driving the others away, collect his scattered charge and proceed. He was several times afterwards thus sent alone, for the amusement of the curious, or the convenience of his master, and always behaved in a similar manner. The story reached the ears of a gentleman travelling in that neighbourhood, who bought the dog for a considerable sum of money.

A shepherd visiting his flock among the Grampian hills, happened to carry with him one of his children, an infant under four years old. This is a common practice with Highlanders, that their children may early become accustomed to the severity of the weather. After traversing his pastures for some distance attended by his dog, the shepherd had occasion to mount a hill, which he thought too fatiguing for the child, and therefore left him on a small plain at the bottom, with a strict charge not to stir till he came back. Scarcely, however, had he gained the top of the hill, when a thick fog suddenly came on, and he anxiously returned to look for his child; but, owing to the darkness and his own alarm, he missed his way, and searched for the infant in vain during several hours. His dog was also missing, and after laborious efforts, he wandered in the direction

of his own cottage, whither he arrived after night-fall. Next morning, accompanied by a band of neighbours, he renewed the search, but in vain. On returning home at night, he learnt that the dog had been home, and on receiving some food had set off again. These visits of the dog, and the search of the neighbours, continued for several days, when at last the shepherd determined to wait for the dog and follow him. The animal led the way to a cataract at some distance from the spot where the shepherd had left his child. Down the rugged precipice near this cataract the dog plunged, and disappeared in a cave, almost on a level with the torrent. The shepherd with great difficulty followed, and what were his emotions on beholding his child eating, with much satisfaction, the food which the dog had just brought him, while the faithful animal stood eyeing his young charge with the utmost complacency!

A gentleman sold a considerable flock of sheep to a drover, which the man had not hands to drive. The seller therefore told him that he had a very intelligent dog, which he would send to assist him to a place thirty miles off; and that when he reached the end of his journey, he had only to feed the dog, and desire him to go home. The dog set off with the drover, but did not come back for many days, when, to the great surprise of his master, he returned with the whole flock of sheep. The fact was, that the drover, admiring the dog, intended to steal him, and therefore locked him up until the time when he was to leave the country. The dog grew sulky and made many attempts to escape, and one evening he succeeded. Whether the animal suspected that the drover had stolen the sheep, it is difficult to say; but he immediately went to the field, collected the sheep, and drove them all back to his master.

A Scottish shepherd was in the habit of sending home such ewes as had lost their lambs, in charge of the *shepherd's* dog. This animal always took them carefully home, and put them into a fold close to the house,

ing watch over them until the farmer himself, or of the family, came to take charge of the sheep. Immediately on this, the dog hastened back to the shepherd, who sometimes sent home as many as three sheep one morning, under the dog's care. The accuracy of attention of this animal were so great, as to be famed over the West Border.







"With joy she views her plenteous reeking store,  
 And bears a brimmer to the dairy door.  
 Her cows dismiss'd the luscious mead to roam,  
 Till eve again recal them loaded home.  
 And now the DAIRY claims her choicest care,  
 And half her household find employment there ;  
 Slow rolls the churn, its load of clogging cream  
 At once foregoes its quality and name ;  
 From knotty particles first floating wide  
 Congealing butter 's dash'd from side to side :  
 Streams of new milk through flowing coolers stray,  
 And snow-white curds abound, and wholesome whey."  
BLOOMFIELD.

In the industrious employments in which women are  
 to take part, there is nothing to be compared to  
 nanagement of a dairy for promoting health and  
 life. Even in large towns the milk-women are the



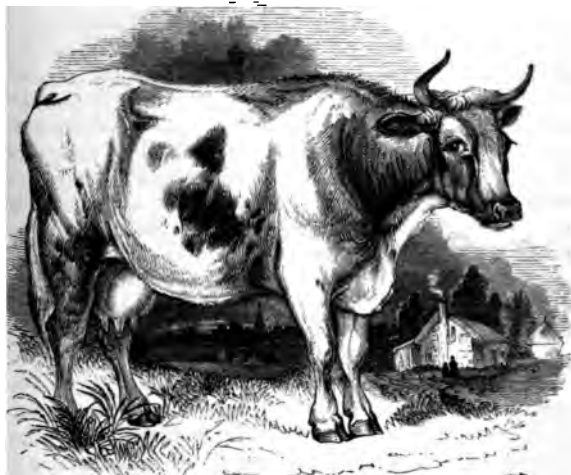
most healthy-looking persons you meet; and in country places the dairyman's wife and daughters are generally blooming as the rose, and gay as the lark. Early rising, constant employment, and great cleanliness, naturally produce a sound body and a cheerful mind; hence the milkmaid has become the emblem of health and good temper. "It was not without cause," says honest Izaak Walton, "that our good Queen Elizabeth did so often wish herself a milkmaid all the month of May because they are not troubled with fears and cares, but sing sweetly all the day, and sleep securely all the night."

There is, indeed, much to make dairy people happy and contented. Their labour is sure to bring a good return; and if they have not the opportunity of growing rich, they are yet able to earn a comfortable maintenance, without being liable to the heavy losses which large farmers sometimes meet with. Good management and good principles are, of course, necessary to ensure success. A family expecting to gain their livelihood from a dairy must all be prepared to lend a helping hand, and must never think of leaving the work to servants. No one can be expected to take the same care, and feel the same interest in the task as they do; and therefore the business of the dairy should be managed, as far as possible, by themselves.

This we find to have been done by good managers, from very early times. Nor do the wives and daughters of respectable farmers, even now, feel it to be any disgrace to work in their dairies, and to superintend everything that goes on there. And if the times are so far changed that we do not see them carrying their butter and eggs to market, as in former days, yet they are as profitably employed at home, and often become celebrated for their skill in butter and cheese making.

English women have understood the method of making butter from very early times. When the Romans first set foot on this island they found that the inhabitants had abundance of milk, from which they made

butter. But it is curious to learn that our ancestors were, at that time, ignorant of the art of making cheese, until they were taught it by their conquerors; and this is the more surprising, because the art had been discovered among other nations in the very earliest times. One of the most ancient books of Scripture makes mention of it in the following manner:—"Hast thou not poured me out as milk, and curdled me like cheese?" (Job x. 10.) And it is also spoken of in the writings of Homer.



THE COW.

Before we describe the general management of a dairy, let us say a few words concerning that invaluable animal, the cow. This gentle and docile creature is one of the most useful of domestic animals, and contributes largely to the nourishment and comfort of mankind. Her milk is, in itself, a most wholesome and excellent food, requiring no preparation to make it pleasing to

the taste; but from it may likewise be made a variety of dishes, of greater or less richness, according to the ingredients added. Those useful substances, butter and cheese, which are obtained from milk, are also looked upon as necessities of life, and are certainly among the most agreeable articles of diet.

Cows are of different breeds, which are generally distinguished from each other by the length of the horn. Some of these breeds are very superior to others; but, in the choice of cows for any particular dairy, it is often found best to select those that have been reared in the immediate neighbourhood, or in pastures of very similar kind; for, if cows are taken from rich pastures and brought to inferior land, they will not thrive or yield according to the expectations of their owner. Small, active cows will thrive, and keep in good condition on poor land, while fine large cows would fall off daily. It is of great importance, as it respects the quality of milk, that cows should be of a peaceable and contented disposition, not apt to break through fences, or to get easily frightened. To make them docile they must be gently treated, and frequently handled when young. Rough usage, or hard driving of cows, is most mischievous to them, and should be severely punished in cow-boys or others that are found guilty of it.

Whatever breed the cow is of, the same general directions as to treatment may be given. The animal should always have plenty of food, of a juicy as well as nourishing kind; otherwise a good supply of milk cannot be expected. If the pastures are scanty but extensive, a greater number of cows will be required to produce the same quantity of milk which a small space of rich herbage would yield from a few. Cows that wander in the open pastures, and take exercise and food at their own discretion, are seldom unhealthy or in need of medicine. A healthy young cow, well treated and well fed, is often kept to old age, that is, for twelve or fourteen years, without any symptoms of disease.

The milk of cows is chiefly used among Europeans for the purposes of the dairy, but that of goats, and even of sheep, was formerly much employed in several parts of this country, and is, even now, not gone quite out of use. The milking of ewes is alluded to in many Scottish ballads; and, at no very distant time, ewe-milk cheese was to be met with in our markets. It was, however, a strong-flavoured, unpleasant cheese, and not worth the trouble of making. The milking of ewes was also injurious to the welfare of the flock, and has been almost everywhere discontinued, since the improvement of live-stock has become so great an object with the farmer.

Milk is of so delicate a nature that it is affected by the least change in the state of the air. No sooner is it drawn from the cow than it begins to be acted upon by the warmth or coolness, the closeness or openness of the weather, and by many other circumstances which we scarcely take into account. The business of the dairy, therefore, calls for much care and attention, and, above all, for extreme cleanliness. A little inattention in leaving cheese, meat, &c. in a dairy, or in not ventilating it properly, will turn all the milk sour. Nothing is worse than the smell of provisions in a milkhouse and a good dairymaid will take care to admit nothing of the sort.

Milking is carried on in the cool of the morning and evening. Before sunrise the household of the dairy farmer is all astir. The lads and lasses are abroad whilst the dew is heavy on the grass; they have been breathing for hours the pure morning air, have seen the glorious sun arise, have mingled their carols with those of the lark, and have borne home their well-filled milking pails, before the drowsy citizen has shaken off his slumbers, or begun to think about the business of the day.

“A friendly tripod forms their humble seat,  
With pails bright-scour’d and delicately sweet.  
Where shadowing elms obstruct the morning ray,  
Begins the work, begins the simple lay.”

Sometimes the cows are milked in their pastures, and the milk is carried home; but when the pastures are distant, the cows are driven gently towards the dairy by the cowboy.

“Straight to the meadow then he whistling goes;  
With well-known halloo calls his lazy cows :  
Down the rich pasture heedlessly they graze,  
Or hear the summons with an idle gaze;



MILKING.

For well they know the cow-yard yields no more  
Its tempting fragrance nor its wintry store.  
Reluctance marks their steps sedate and slow:  
The right of conquest all the law they know;  
The strong press on, the weak by turns succeed,  
And one superior always takes the lead;  
Is ever foremost, wheresoe'er they stray :  
Allow 'd precedence, undisputed sway :  
With jealous pride her station is maintain 'd,  
For many a broil that post of honour gain'd."

Three important rules have to be observed in milking: these are, regularity, gentleness, and cleanliness. If possible, each milker should have the same cows every day, and should keep exactly to the same time of milking, and milk them in the same order, while they are eating their fodder. The milking should be steadily kept on with, till the udder is dry; not done at intervals, with pauses between.

It has been well said, that "To be milked by different hands, at different parts of the day, in a slow, interrupted, gossiping manner, and leaving part of the milk in the udder, will ruin the best cow in the world." Gentleness must be persevered in, however troublesome or wayward the animal may be. A quiet, soothing voice, and tender handling, will, in time, produce the desired effect. Cleanliness is of the highest consequence. Not only should the milk-maid be clean in her own person, and always milk with clean hands, but she should wash and sponge the udders of the cows before she begins milking. If this were always done, the milk would be much purer, and the cows would then be saved the pain and annoyance of sore teats, which they are very apt to suffer from, if neglected. Where milking is performed in a slovenly manner, and without regard to cleanliness, instead of being a pleasant and interesting sight, it becomes absolutely disgusting. Self-interest, as well as decency, ought to teach every one to be clean in dairy-work; for the clearness and good flavour of the butter and cheese must greatly depend on the purity of the milk; and nothing is so offensive as a dull or dingy appearance in an article of food.

Nowhere, perhaps, is dairy-work performed with such strict attention to cleanliness, as in Holland. Of the cow-houses of the village of Broek, in that country, a recent writer says, "I am sure that nine-tenths of the poor people of England, and a much larger proportion of the Irish, are not so well and cleanly lodged as the

brutes in this country. The pavement was of Dutch tiles, the walls of deal boards, not painted, or rough sawn, but as smooth and clean as a dining-table in an English farm-house. From one end of the stable to the other, runs a gutter; and above it, over each stall, a hook is fastened in the ceiling. When the cattle are within doors, their tails, from motives of cleanliness, that they may not dangle in the dirt, and besmear their comely sides, are tied up to these hooks in the ceiling." Such are the winter quarters of Dutch cows; in summer they remain in the open pastures.

In England, where the cows generally feed within a very short distance of the dairy, they are, for the most part, driven home twice a day to be milked; and thus they are constantly beneath the eye of the owner, and any neglect must immediately come under his notice. But, in mountainous countries, or where the pastures are very distant, it is found better to send milkers to them, than to heat and disturb the animals by so long a journey. It is a great object in such cases to bring the milk home with as little shaking as possible; this is very conveniently done in Holland, by water-carriage; for all the best pastures are surrounded by small canals, communicating with the larger, and the milk is thus conveyed in small boats for several miles, without the least agitation.

The milk being brought home, the proper business of the dairy now begins. By "the dairy," is understood the whole building in which dairy operations are carried on, where dairy utensils are kept and cleaned, and where cheese is stored; but this consists of two or three apartments, and that one which is devoted to the keeping of milk and to the making of butter and cheese, is called the dairy, in particular; though often, likewise, called the milk-house.

The proper situation for a dairy is on dry and rather *high* ground, with a gentle slope. It is generally *shaded* from the sun by trees, or is placed on the north

side of the dwelling-house, so as to be in the shade of higher buildings.

Due north th'unglazed windows, cold and clear,  
For warming sunbeams are unwelcome here.

A dry cool air is that which best preserves the sweetness of milk and cream, therefore the dairy is usually covered in with thatch, and is well ventilated. No stagnant pools, or offensive drains, are allowed in the neighbourhood. The floor of the dairy is of stone, brick, or paving tiles, with a gentle slope towards a drain, to carry off the water. But this drain ought not to communicate with any sink, but run out into the open air, otherwise there will be an unpleasant smell from it in hot weather, which will do much mischief in the dairy. The utmost cleanliness must be preserved in the dairy floor, and in the water-drain. Round three sides of the dairy there should be a stone or brick bench, to hold the milk-pans; and a little above these should be air-holes in the wall, covered with wire, and having shutters to slide over them in severe weather. The windows should be fitted with wire gauze, instead of glass; thus plenty of air will be admitted without allowing insects to enter. The milk-house should be shaded by trees, and the floor should be kept moist in summer for the sake of coolness. Milking-pails are commonly made of very clean white wood; but tin and copper vessels are likewise employed, being kept very bright within and without, that the least speck of dirt may be visible. They are of different sizes, to suit the convenience or fancy of dairy-women; and, sometimes, instead of white wood, they are made of thin oak staves, and bound with iron hoops.

When the milk is brought into the dairy, it is strained through a fine sieve, and poured into shallow pans, or



MILKING-PAIL.



into troughs, lined with lead. The pans are of earthenware or metal. The latter is preferred, because it cools rapidly in summer, and may be readily warmed in winter. Iron-tinned or zinc vessels are better than brass, or than leaden troughs. The latter especially have been injurious, from the formation of white lead, where the cream acts upon them; and dairy-maids have even suffered from the painter's cholic, owing to this circumstance. Great praise has been bestowed on vessels of zinc, which are said to increase the quantity of cream, by means of a galvanic action which takes place between the acids contained in the milk and zinc. The milk is poured into the pans to the depth of four or five inches, and is exposed to a draught of air from opposite windows. In twelve hours all the best of the cream has risen to the surface, and if skimmed and churned immediately, it makes a very delicate butter; but it is generally left for twenty-four hours, and then skimmed, and put into a deep earthen jar. In removing the cream from the milk, a thin shallow dish is used, which is called a skimmer or creamer. This dish is of tin, with



UPRIGHT CHURN.

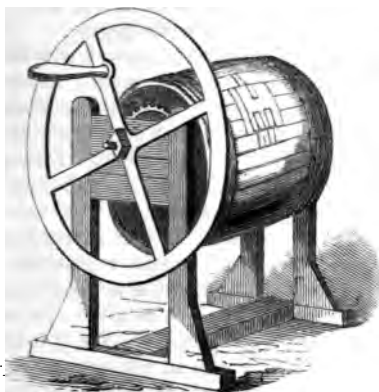
holes in it, or of wood, or of stone-ware; tin being, perhaps, the most common. In dairies of the usual size, the cream is churned every two days.

Churning is merely the beating or agitating the cream in a wooden vessel. Churns are of different shapes and sizes. The common upright churn is a wooden cask broader at the bottom than at the top, and having a round lid with a hole in the centre. Through this

hole a stick passes, which is four or five feet long, and

has at the lower end a round flat board, with holes in it. This board is a little smaller in circumference than the top of the cask, and is worked up and down, so as to keep the cream violently agitated.

The same purpose is answered by the barrel churn, which turns on an axle by means of a common winch, and is sometimes moved by horse-power, or even by steam.



BARREL-CHURN.

The cream is strained into the churn through a cheese-cloth. The cloth is dipped in water, and held over the churn, and the cream poured gently into it from the jar. Most of the cream runs through into the churn, but lumps and impurities remain behind. If the churn be an upright one, a cheese-cloth is kept round the mouth of it; if a barrel-churn, under the bung, otherwise some of the cream will be dashed out in churning. In using either churn, discretion is necessary as to the motion given to it. Butter is soft and frothy, or strong and ill-flavoured, if the plunger of the churn is worked too quickly, or too slowly. There is a re-

gular equal motion, moderately slow at first, but gradually becoming quicker, and always given in the same direction, which is found to produce the best effect. In the course of half an hour, or, perhaps, much longer, according to the state of the weather, or the season of the year, the butter begins to make its appearance in small lumps, or kernels, which gradually increase in number. These are collected and placed in a shallow tub, and when all the butter is come, the buttermilk which remains is set aside for the pigs.

The butter in the tub is now spread out thin, beaten with the hand, or with a flat wooden spoon, and repeatedly washed in clear spring water. Some persons prefer working it well without water, from an idea that the washing makes it poor in quality. Either way, the mass must be freed of buttermilk, and must be kept very cool. It is a great advantage to a dairy-maid to have naturally a cold hand; if this is not the case, she is obliged to plunge her hands repeatedly into cold water, or to work the butter with a wooden beater, or a cloth rolled up in a ball, so as to avoid the handling of the butter as much as possible. Dairy-maids should frequently wash their hands in hot water, using oatmeal instead of soap, and then rinse and steep them in cold water afterwards.

The butter is next weighed out into pounds, or half pounds, and printed, or into two-pound pieces, and rolled. The print is of wood, with a small air-hole in the centre, and has some fancy pattern carved upon it. A ball of butter is pressed upon this pattern, shaped round the edges, and then flattened a little upon a marble or wooden slab. The print is then loosened from it by a smart blow.

But, in large dairies, unless they are situated near a city, or populous town, a great part of the butter is not made up in this way, but is immediately salted and put into casks, or firkins, made of clean white wood, and containing, about fifty-six pounds weight. About three

or four pounds of the finest and best salt is well mixed with this quantity, and a layer of salt is put at the bottom of the cask. If there is not enough butter to fill the cask at once, it is also covered with a layer of salt, and a cloth is spread over to keep out the air. When the cask is filled up, the layer of salt is taken off the first quantity with a spoon, and the surface is made rough, that the second quantity may mix with it, without leaving a streak where the two meet. When the cask is full, a layer of salt is put on, and the head of the cask fixed in its place. If the butter shrinks considerably, it is a sign that it was not well made, the butter-milk not having been properly pressed out of it. Good, well-made butter does not shrink, but keeps its flavour for a long time. Sometimes, instead of salt alone, the following mixture is used in curing butter :—half an ounce of dry salt pounded fine, two drachms of sugar, and two drachms of salt-petre, for every pound of butter. This is understood to keep the butter sweet a long time, but injures its flavour for the first fortnight.

Every one has heard of Devonshire butter and Devonshire cream, as being very rich and excellent. The management of the cream is different to that which we have described. The milk, instead of being set in shallow dishes, in a cool place, for the cream to rise slowly to the surface, is poured into tin or earthen pans, each holding about eleven or twelve quarts; twelve hours after milking, these pans are placed on an iron plate, over a small furnace. A thick scum gradually rises on the milk; a little of this is removed with a spoon from time to time, to see when bubbles begin to rise on the milk beneath. As soon as the bubbles appear, and before boiling begins, the milk is taken off and allowed to cool. The thick part is then taken off, and this is the celebrated *douted cream* of Devonshire; a substance which is thicker than our cream, but not so thick as butter. The process of churning to make this cream into butter, as well

as the making up, &c., are conducted in the way already described.

In some parts of Holland, and in Scotland and Ireland, the cream is not separated in butter-making; but both milk and cream are churned together in large upright churns, the plungers of which are sometimes worked by machinery. The Dutch method is to put the milk into deep jars, in a cool place, keeping each milking separate. As soon as the milk becomes a little sour, the churning takes place. A horse is employed to work the machinery, or it is set in motion by a dog walking in a wheel, which he turns by his own weight. The butter of Holland is celebrated for its excellence, and is considered superior to that of any other country; but there is no doubt that we might equal the Dutch in this article, if we were as careful in the matter of cleanliness as they are. The care they bestow on their dairy-vessels and milk-houses, and the perfect cleanliness observed in the whole process of milking and butter-making, may seem to be carried to a ridiculous extent; but those who really understand the delicate nature of milk, are well aware that it is impossible to be too particular in these respects, since the least taint of the atmosphere, or the smallest particle of decaying matter accidentally introduced, is sufficient to turn the milk. By an exaggeration of this fact, it is common in country places to speak of the looks of the dairy-maid as having some influence, and to say (if her temper be not very good) that on going into the dairy she will "turn all the milk sour."

Though less delicate than milk, butter is also acted upon by substances near it, and requires to be kept in a clean place, where the air is pure. Every house-keeper knows that fresh butter, as well as milk, should be kept in a different place from meat, cheese, &c., especially in summer, when the closeness of the atmosphere assists in turning it sour. It is on account of *this delicacy* in butter that coolers of porous earthen-

ware have been contrived, for keeping it sweet, and free from the oily appearance which it otherwise has in hot weather. The water in these coolers is kept at a low temperature by constant evaporation through the pores of the earthenware, and may be still further cooled by dropping into it a few lumps of ice. In America, butter is commonly brought to table with large lumps of transparent ice glittering on the top of it; and it is likely that ice will be more abundantly used in this country for keeping provisions, now that companies have been formed for supplying London and other large cities with ice during summer. In India, where the heat of the climate prevents the formation of solid butter, the inhabitants make from the milk of the buffalo what is called *ghee*, a sort of liquid butter, in which they carry on a considerable traffic. It is carried from place to place in leathern bottles, containing from ten to forty gallons. This *ghee* is made in other countries of the East: the Arabs, in particular, use a large quantity of it, each individual being in the habit of drinking a cupful every day at his morning meal.

Butter is naturally of a yellow colour, which is deeper when the cows are feeding in rich pastures, or when they have newly calved. This colour is often imitated, by mixing annotta, or the juice of carrots, with the cream. But nothing can supply the rich flavour which accompanies the natural colouring of fine May butter; the imitation, therefore, is soon detected.

Annotta, often spelt *arnotto*, and *arnatta*, is a dye obtained from the rind or pulp surrounding the seeds of a South American plant. It is received in this country in balls, rolls, or cakes, and is largely used in the butter and cheese making districts. The tree from which it is obtained is small, with deep green, shining, heart-shaped leaves, and clusters of purplish flowers. The latter are succeeded by large seed-vessels, also heart-shaped, covered with bristles, and opening into two valves. These contain a number of seeds, covered with a soft, vermilion-

coloured rind, which furnishes the annotta of commerce. The seeds are heaped up in water for several weeks or months, and afterwards pressed, when the colouring matter separates, and is afterwards precipitated by the water.



ANNOTTA PLANT. (*Bixa Orellana*.)

This dye is tasteless and harmless, and is therefore preferred to any other colouring matter in the preparation of butter and cheese.

In some cheese dairies an inferior butter, called whey-butter, is made from the oily part of the milk skimmed from the whey; this seldom comes to market, but is sold at a low price to labourers. It will not keep, and is unfit for salting.

Speaking of the quantity of butter produced by a single cow, an experienced writer says:—"A good cow

should produce six pounds of butter per week in summer, and half that quantity in winter, allowing from six weeks to two months for her being dry before calving: that is, 120lbs. in twenty weeks after calving, and 80lbs. in the remainder of the time till she goes dry,—in all about 200lbs. in the year. If she produces more, she may be considered as a superior cow; if less, she is below par. To produce this quantity the pasture must be good; and if we allow three acres to keep a cow in grass and hay for a year which is not very far from the mark, the butter made will produce about 10*l.* at the distance of fifty miles from London, if it is sold in a fresh state, and the calf about 15*s.* at a week old. This does little more than pay rent and expenses; the profit must be made by feeding pigs, or making skim-milk cheese."

The consumption of butter in England is immense. The produce of all our own dairies is consumed at home; yet we are obliged to import large quantities from Ireland and from the north of Europe; and these quantities are increasing year by year. Our exports of butter are all of the produce of Ireland, and these are also very considerable.

But it is time that we return to the dairy, and notice the making of cheese, which is likewise a most important business, and the source of large and profitable traffic. To those who are ignorant of dairy-work, it will be necessary to remark that milk is composed of three distinct substances—cream, curd, and whey. The cream separates first, and is taken off to form butter; the milk, if left to become sour, also separates into two parts, curd and whey; but as the cheese is injured by allowing the milk to become sour, an acid is used which soon curdles the milk, without injuring its quality. The acid commonly used in this country is called *rennet*, which is a preparation of the gastric juice from the stomach of a sucking calf.

The experience of the dairyman teaches him exactly *the quantity of this acid required to turn a certain*



quantity of milk. But if he is doubtful as to the strength of his rennet, he tries it on a ladleful of warm milk, and by the quickness or slowness of the curdling, and the form of the flakes of curd, he knows whether it is strong or weak, and uses it accordingly.

The method of preparing rennet is very simple. Where calves' stomachs cannot be obtained, those of pigs are sometimes made use of, and are found to answer the purpose equally well. When the pigs are killed in winter, the inside skins of the stomachs are taken out and wiped clean with a cloth, but not washed. They are then laid flat on a table, rubbed thickly with salt on both sides, and placed on a dish for about four days, at the end of which time they have sufficiently imbibed the salt to be dried and stored for use. In drying they are stretched out and hung near the fire, after which they will keep until the next season. When rennet is wanted, one of these skins is placed in a jar, with about three pints of strong brine, made of salt and boiling water. It remains in this brine three or four days, the mouth of the jar being covered with bladder. The strength of the liquor is then tested, and if it curdles milk easily, the skin is taken out, and the rennet bottled and tightly corked. The skin is again salted and dried, and will answer the same purpose on another occasion.

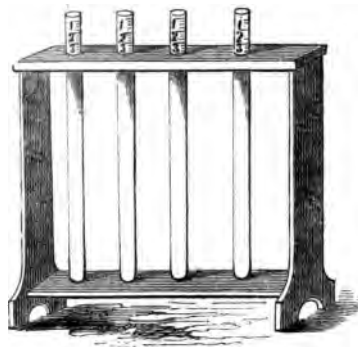
The cheese-making season begins in May, and lasts until the end of September, or even longer, if the weather is favourable. In some places, cheese is made all the year round; but that produced in the winter months is inferior, and takes longer in becoming fit for use, than cheese made in spring or summer. Thick cheeses are mostly made in May, June, and the beginning of July. The making of cheese is carried on in nearly every county in England, but there are particular districts which have long been famous for their *cheese*, and from which the different sorts of cheese in *our shops* are named. The kinds most generally known

are Stilton, Cheddar, Cheshire, double and single Gloucester, Derby, Lancashire, Suffolk, and Wiltshire cheese.

There is a wide difference in the qualities of these several kinds of cheese. While some, as Stilton and Cheshire, are famous for their excellence, others, as Suffolk, are noted for their inferior quality. The excellence of Cheshire cheese, whether justly or not, has been attributed to the abundance of saline particles in the earth, arising from the salt springs which abound throughout a large portion of that county. Fuller, in his "Worthies," when speaking of Cheshire, says, "It doth afforde the best cheese for quantitie and qualitie, and yet the cows are not, as in other shires, housed in the winter. Some essaied in vaine to make the like in other places, thoughte from thence they fetched their kine and dairie-maides: it seems they shoulde have fetched their grounde too, wherein is surelie some occult excellencie in this kind, or else so goode cheese will not be made." However rich the pastures, it cannot be expected that good cheese can be made from milk that has been deprived of all its cream. This is generally the case with Suffolk cheese, and hence the complaint of the poet Bloomfield, who, in speaking of the cheese of his county, says—

"Its name derision and reproach pursue,  
And strangers tell of 'three times skimm'd sky-blue';  
To cheese converted what can be its boast?  
What, but the common virtues of a post!  
If drought o'ertake it faster than the knife,  
Most fair it bids for stubborn length of life;  
And, like the oaken shelf whereon 'tis laid,  
Mocks the weak efforts of the bending blade;  
Or in the hog-trough rests in perfect spite;  
Too big to swallow, and too hard to bite.  
Inglorious victory! Ye Cheshire meads,  
Or Severn's flow'ry vales, where Plenty treads,  
Was your rich milk to suffer wrongs like these,  
Farewell your pride; farewell renowned cheese!  
The *skimmer* dread, whose ravages alone  
*Thus turn the mead's sweet nectar into stone.*"

There are many causes which make certain districts famous above others: the merit does not lie wholly in the pastures, though these are the chief causes of success; much is also due to the skill of the dairy people, and the breed of cows they keep. The milk of cows varies greatly in richness, as any one may see by using a simple little instrument called a *lactometer*, which shows the



THE LACTOMETER.

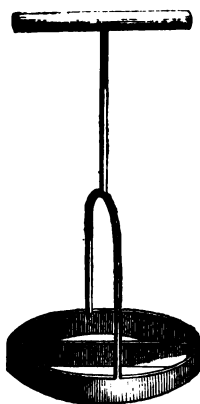
proportion of cream to the milk of any particular cow. The best kind of lactometer will show the comparative richness of the milk of four or five cows. It consists of four or five glass tubes, about half an inch diameter and eleven inches long, fitted into an upright mahogany frame; each tube having a fine line drawn round it ten inches from the bottom; three inches from the line downwards it is graduated into inches and tenths of inches. At milking-time, each tube is filled up to the line with new milk, and after standing twelve hours, the quantity of cream floating on the surface is shown by the scale of inches and tenths; each division representing one per cent of the whole. If the milk given by a cow at one milking is a gallon, or eight pints, and

the depth of the cream in the lactometer is fourteen divisions, you multiply the number of pints, 8, by the depth of the cream, 14, and the result will be, that the produce of the cream of that milking is 112, or 1 pint  $\frac{1}{10}$ . By using this ingenious little apparatus, it will be seen how much difference there is in the milk of cows, even in the same dairy, and under the same treatment. One may easily understand, therefore, that in dairies where the owners are careful to keep up their stock of cows of the best breed, and are, moreover, very careful in the regularity and cleanliness of all the business of the dairy, they may be able to produce a superior article with the very same kind of pastures which are to be found in less celebrated dairies.

In most of the cheese districts, an artificial colour is given to the cheese, by mixing annotta with the new milk. Genuine annotta is rather soft to the touch, and easily dissolved. A small quantity of it being mixed with a little milk, is poured into the whole quantity to be made into cheese. But the hard substance usually sold for annotta, is said to be a preparation equally harmless, made in imitation of it. This requires to be rubbed against a hard, smooth pebble, being previously wetted with milk. The annotta and the stone being frequently dipped and washed in the milk, sufficient dye is thus obtained to colour deeply a dish of milk, which is first stirred briskly, and then allowed to settle, after which it is poured gently into the cheese-tub, taking care to keep back the settlings. An ounce of annotta will colour about twenty cheeses of ten or twelve pounds each; but the quantity of this substance used is greater or less, according as the cheese is to be sold as Cheshire, Gloucester, &c. The poorest cheese generally receives the greatest quantity of dye, in order to give it an appearance of richness.

The process of cheese-making is carried on much in the same way in different counties. When the rennet *has been added to the milk, and the curd has formed,*

and is firm enough to be separated from the whey, the dairy-woman plunges her hands to the bottom of the cheese-tub, and with a wooden dish stirs the curd and whey; then lets go the dish, and by her hand agitates the whole, carefully breaking every part of the curd, until it is all reduced to fragments, not exceeding the size of a hazel-nut. This is done to prevent lumps



THE CURD-CUTTER.

called slip-curd, which are apt to form and harden, retaining a portion of whey, and injuring the quality of the cheese.

The breaking of the curd may be likewise conveniently done by means of an instrument called a *curd-cutter*, which is an oval hoop of copper, with a stem of round copper rod, and a wooden handle. After this thorough stirring and breaking, the curd rapidly sinks, and the milk-woman lades off the whey, setting it aside for whey-butter, or sending it immediately to the hog-tub. When she has taken out all the whey she can

from the curd, by pressing it with her hands and with the lading-dish, she takes a knife and cuts the curd into square pieces of about two or three inches. This allows more whey to flow from it, and also makes it more convenient for handling.

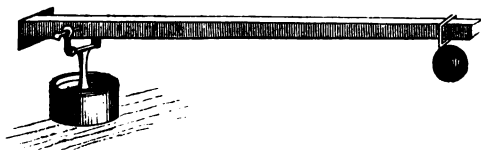
It is now ready for the cheese-vat. The common sort of vat is built of elm staves, as being least liable to burst with pressure. It has a substantial bottom pierced with holes to allow the whey to flow away, and a strong wooden cover fitting it exactly. In some places, cheese-vats are made of tin with holes in the bottom. The *dairy-woman* now chooses a vat or vats, according to the quantity of curd, and, spreading a cheese-cloth

loosely over the mouth of the vat she is intending to fill, she again breaks up the curd, carefully squeezing every part of it, until the vat is filled, and the curd heaped up in a rounded form above the top; the ends of the cheese-cloths are then folded over, and the vat, with its contents, placed in the cheese-press, where it is subjected to pressure, according to the size of the cheese. There are generally two or three kinds of cheese-presses in large dairies, differing from each other as to weight or pressure.



THE CHEESE-VAT.

The most simple kind of cheese-press is merely a long beam, one end of which is often placed in a hole in the wall. This beam acts as a lever, the cheese being placed in its vat between the weight and the fulcrum. Another form is a large square stone, suspended by a

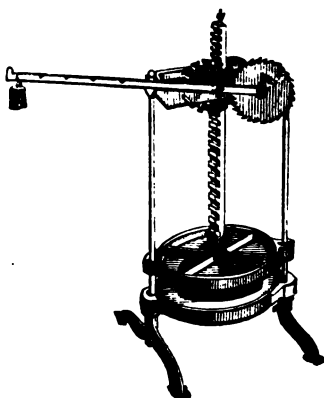


COMMON CHEESE-PRESS.

screw, between the side posts of a timber frame. The cheese-vat is placed under it, and the stone is lowered upon the sinker, by turning the screw to the left hand, and raised again by turning it to the right. But the most complete and effective press is of cast-iron, and consists of a frame with a perpendicular piston, flat below to cover the sinker of the cheese-vat. The piston is raised or lowered by a small pinion attached to a ratchet wheel and lever, three feet long. The lever is grooved on the upper side to hold the ring of the weight for increasing or diminishing the power, in proportion to the distance from the ratchet wheel. The pressure

of this instrument is equal to about twenty tons, and its cost is about four and twenty shillings.

The vat being placed in the press, and the weight applied, remains in that situation for two or three hours; it is then removed, and the cheese taken out and allowed to stand for an hour or two in a vessel of hot whey, for the purpose of hardening the coat of the cheese. Afterwards it is wiped dry, left to cool, and then covered with a clean cloth, and returned to the vat, which has also been wiped quite dry. It is then replaced in the press for about the same time as before. This occupies till evening of the day in which the cheese was made. The



IMPROVED CHEESE-PRESS.

cheese is then again taken out of the vat, and another dry cloth being applied, it is turned and put back as before. In this manner it is taken out, wrapped in clean cloths, and turned in the vat twice a-day for two days, when it is finally removed. In all this process, the state of the cheese-cloths is not an unimportant matter. The dairy-maid should be well supplied with

these articles, which are large towels of a light and open texture, which should be washed and wrung out of boiling water, without soap, and dried in the sun after every time of using. And here it may be noticed, that coarse linen cloths are alone fit for use in the dairy. All the dairy-vessels should be washed with such cloths, *instead of* woollen ones, which are apt to leave an *unpleasant* smell. Wood or metal vessels should likewise

be rubbed with clean dry cloths after washing, and not set to drip, in the same way as stone ware.

When the cheese is taken for the last time out of the press, it is carried in the vat to the salting-tub, where it is covered with brine, and allowed to stand several days, being regularly turned once a day. The vat is then taken out, and the cheese removed from it to a salting-bench, where it stands for a week or ten days, being carefully rubbed with salt every day during that time. If it is of large size, a wooden hoop, or a fillet of cloth, is put round it, to prevent it from cracking. After it is supposed to be sufficiently salted, it is placed on what is called the drying-bench, where it is allowed to remain another week or ten days before it is removed to the cheese-room. In the making of Cheshire cheese, the salt is well mixed with the curd, and not merely rubbed on the outside.

The management of cheese in the cheese-room depends upon the judgment or skill of the dairy-woman. Repeated wipings and turnings of the cheese are necessary, and much caution as to the admission of the air. A dry cold air is shut out as much as possible, to prevent the cheese from cracking, but if the air be close and moist the windows are thrown open, and a thorough ventilation allowed.

When cheeses are badly made, they are very apt to burst. Any change in their proper shape after they are taken out of the cheese-vat, is a sign of mischief going on within, but if they can be prevented from bursting open, a slight decay or mouldiness in the inside is not considered an objection. In fact, this is sometimes produced artificially in rich cheeses, to please the palate of persons who consider such mouldiness a dainty. After being in the cheese-room for about ten days, the cheeses are washed and scraped. To shorten the labour of turning cheeses in drying them, an invention called a *swing-frame* is now used in some of the large dairies. By this, it is said, *fifty-five cheeses* can be turned in the time required



to turn two by the hand. It consists of a dozen strong shelves framed together, and having bars nailed from top to bottom of one side of the back of the shelves, in order to prevent the cheeses from falling out while in the act of turning. The frame is suspended on two strong pivots, one of which is let into the wall of the room, and the other is supported by a strong post. Two catches keep the frame upright, and prevent it from being turned more than half round. By first filling the shelf immediately below the axis of the frame, and then placing the cheeses alternately on the two nearest shelves above and below that which has been already filled, the preponderance of one side over the other can never be more than one cheese; the whole power, therefore, required to turn the machine, cannot, in any circumstances, be greater than this and the friction of the pivots. The cheeses in the act of turning drop on those shelves which, in the former position of the frame, were above them, and which having been exposed to a current of air for twenty-four hours previous, have become dry.

The above will give a general idea of the process of cheese-making, although particular dairies have methods of their own. For instance, in making Stilton cheese, the cream of the evening's milk is added to the morning's milk, to enrich it, the rennet is very pure, the curd is not so much pressed as in other cheeses, and the form of the mould, or vat, is much deeper, while the circumference is less. While the cheese is drying, it is occasionally powdered with flour, and plunged into hot water, which hardens the outer coat, and helps to ripen the cheese. Stilton cheeses made in Leicestershire, Derby, Cheddar, and some other cheeses, are never coloured; but those of Gloucestershire and North Wiltshire, are deeply coloured. Very little colour is used in foreign cheese.

Cream cheeses are soft and rich cheeses, not intended to be kept long. The curd in such cheeses is not broken up, but lifted whole into a sieve, where it drains

gradually, and is moderately pressed till it becomes firm. These cheeses are sold as soon as made, and unless immediately consumed they become soft and putrid. Stilton cheeses are intermediate between these soft cheeses and those designed for long keeping. So also are Gruyere cheeses, which are made from new milk. There is a celebrated cheese, among the harder kinds, called Parmesan cheese. This is made from the milk of stall-fed cows, in the country between Cremona and Lodi, which is the richest part of the Milanese. Skimmed milk is used for this cheese, and is heated in a large cauldron, which turns on a crane, over a slow wood fire, let into the ground. When the milk is of a proper warmth to receive the rennet, the cauldron is turned off the fire for a time, until the curd has formed, when the whole is stirred up, part of the whey removed, and the cauldron set over the fire again, until a good heat is obtained, though below boiling. A certain quantity of saffron is put in to give colour and flavour to the cheese. When the curd has come to the proper consistency, which is in about an hour and a half, the cauldron is taken off the fire, the curd collected in a coarse cloth, put into a hoop, and pressed for about an hour, when the cloth is taken off, and the cheese placed on a shelf in the same hoop. At the end of two or three days, it is sprinkled all over with salt, and this is repeated every second day, for about forty or forty-five days, when no further salting is required.

In some parts of Saxony, cheese of good quality is formed by an admixture of potatoes with the milk. The large white kind of potatoes are preferred for this purpose, and when boiled and peeled are allowed to cool, and then reduced to a smooth pulp, either by grating or pounding in a mortar. To five pounds of this pulp there is added one pound, or about a pint, of sour milk, with the usual quantity of salt. The whole is then kneaded together, covered up, and allowed to remain for *three or four days*. The pulp is then again kneaded,

and placed in small wicker baskets, through which the superfluous moisture drains. The pulp is then moulded into shape by being put in small pots, in which the cheeses are allowed to dry in the shade, during about fifteen days, after which they are put in store. The older they are, the better they become; and if kept dry, they will keep for a number of years. Three kinds of this cheese are made: the first, or most common, according to the above proportions; the second, with four parts of potatoes, and two parts curdled milk; and the third, with two parts potatoes, and four of milk. Ewe milk is employed for this purpose, as well as that of cows.

Cheeses, when well salted, and thoroughly cleared of whey, will keep for years. And if in the course of time they become hard and dry, they can be restored, (if rich in quality,) by being washed several times in soft water, and then laid in a cloth, moistened with wine or vinegar. They will gradually lose some of their saltiness, and will become mellow and agreeable. This is a plan commonly pursued in Switzerland, where cheese is stored for many years.

From this short account of the general round of dairy-work, it will be seen that there is full and constant employment for those concerned in it, and that it requires neatness and cleanliness in a high degree, as well as regularity, early rising, and good temper. It is therefore calculated greatly to benefit the persons employed in it, by making it a matter of necessity with them to cultivate these good habits. The only reasonable objection to the work of the dairy, is, that it can never, on any occasion, be set aside; that the time of sickness or domestic calamity does not bring any respite; and that even the sacred hours of the Sabbath witness the same toils. This is certainly an objection, from which most other employments are free. But with respect to *the Sabbath*, it must be remembered, that the early hour in the morning at which dairy-work is performed,

leaves the most important part of the day free for attendance on Divine worship, while the evening labours may also be so arranged as not greatly to interfere with the rest, which is the privilege of both master and servant, on that sacred day. As to the week-day toil, cheerful labour always brings its own reward; and even the humblest menial, if he serve a good master, may lead a happy and useful life, and may be able to describe his own condition as a "farmer's boy" once described his, in the following lines:—

" \* \* \* meek, fatherless, and poor :  
Labour his portion, but he felt no more ;  
No stripes, no tyranny his steps pursued ;  
His life was constant, cheerful servitude.  
Strange to the world, he wore a bashful look ;  
The fields his study, nature was his book ;  
And as revolving seasons changed the scene,  
From heat to cold, tempestuous to serene,  
Though every change still varied his employ,  
Yet each new duty brought its share of joy."

BLOOMFIELD.







*Round-panicle  
Cock's-foot Grass.*

*Sweet-scented  
Vernal Grass.*

**HAYMAKING** is the most delightful of all rural occupations. It is carried on in the "very spring and playtime of the year," when the fields, and meadows, and lanes, are covered with a rich carpet of grass sprinkled with wild flowers; when hedges are blushing with dog-roses, and fragrant with woodbine; when young oaks are clad in tender green, and the rest of the trees are every day getting richer and deeper in their colouring; when crops are springing and flourishing, and groves are resounding with the song of birds; and when the cuckoo's mellow voice blends pleasingly with all the lovely sights and sounds of nature.

Haymaking is as healthful as it is delightful. The heat is not oppressive; the smell of the new-mown grass and flowers is refreshing to the labourers, and the soft greensward is pleasant to their feet.

“The grateful sweetness of the new-mown hay,  
Breathing refreshment, fans the toiling swain.”

Their labour also is not so excessive but that they can indulge in merriment. Wherever you see a group of hay-makers, you may also hear the merry laugh go round; especially when they rest beneath some spreading oak to take their noonday meal, or when in the midst of their work they pause for a moment, to quaff the welcome draught of ale.

The mower is abroad at early dawn, and before the day has closed he has made wide havock among the herbs and flowers of the field. At each sweep of his scythe hundreds of blossoms are laid low, and thousands of springing blades are cut down in their youthful prime. There lie the cardamine, the buttercup, the cowslip, and many a flower besides, half buried in the dewy grass that forms the principal portion of the swathe. And among the grasses themselves there are blossoms of great beauty and variety. When you come to examine them as they lie thus heaped together, or when you gather them in their freshness from the unmown portion of the meadow, you find a greater difference than might be expected in plants which are so much alike in the earlier stages of their growth. There is the *Sweet-scented Vernal Grass*, which forms part of the herbage in almost every situation. This grass, more than any other, gives the delightful scent to new-mown hay, and though it does not thrive well alone, it combines with other grasses to advantage. This is one of the early flowering grasses, blossoming in April or May, and ripening its seed early in June. It is a beautiful and wise provision respecting these early grasses, that they continue to increase in nutriment up to the time of the seed

ripe; whereas the later summer grasses are most  
 le at the time of first flowering. Thus it happens  
 oth are in fit condition to be cut at the same time,  
 gh the former are much further advanced than  
 lter.

re is also the *Cock's-  
 Grass*, a coarser, but  
 a valuable species of  
 re; coming into blos-  
 a June, and ripening  
 d in July. This grass  
 s up very readily after  
 cut, and, therefore,  
 good produce through-  
 the season. If mixed  
 other grasses in a fair  
 tion, according to the  
 of the soil, it is con-  
 sidered equal to most of the  
 e grasses.

cannot look far with-  
 discovering a quantity  
 e-Tail Grass. This is  
 7 liked by cattle, and  
 sequence forms a large  
 tion of the grass of  
 st celebrated pastures.  
 rass is not in full per-  
 till about four years  
 eing sown. The weight  
 ss produced each sea-  
 considerably less than  
 f the cock's-foot, but  
 tritive matter is more  
 ant in proportion.

are particularly fond of the Meadow Fox-Tail  
 and when combined with white clover on a  
 loam, this herbage has been found, in the second



FOX-TAIL GRASS.



season, sufficient for the support of five couple of ewes and lambs per acre. In some instances the culture of this grass has been laid aside, on account of the long time it occupies in attaining perfection, and also because



MEADOW CAT'S-TAIL GRASS.

MEADOW FESCUE GRASS.

it only thrives in perfection on lands that are neither very moist nor very dry. It is on this account less *fitted* for the alternate husbandry; but it is one of the *best grasses* known for permanent pasture.

Conspicuous among its fellows also lies the *Large Meadow Cat's-Tail Grass*, a very valuable grass, and easily known by its size from the Small Meadow Cat's-Tail, which is comparatively worthless.

If our hayfield be a rich natural pasture, or irrigated meadow, we shall also find plenty of *Meadow Fescue Grass*, a large plant with succulent leaves, but apparently much liked by cattle. It delights in a deep loamy soil, and makes excellent hay.

There is also another grass, rich and nutritive when growing on a good moist soil, but of no value where the soil is light and sandy. This is the *Rough-stalked Meadow Grass*, forming an important ingredient in water-meadows. In dry soils, it becomes shrivelled up, and cattle refuse it altogether; but when in a flourishing condition it seems greatly liked by oxen, horses, and sheep. Besides the above there is an almost endless variety of grasses well worthy of attention. There are also the different species



ROUGH-STALKED MEADOW GRASS.

It is not without a feeling akin to melancholy, that one sees all this beauty and variety swept from the face of the earth. "In the morning it flourisheth and

groweth up; in the evening it is cut down and withereth." (Psalm xc. 6.) The change thus wrought in a few hours, also forcibly recalls to mind the following inspired declaration: "As for man, his days are as grass; as a flower of the field so he flourisheth. For the wind passeth over it, and it is gone, and the place thereof shall know it no more." (Psalm ciii. 15, 16.) If, however, there is a feeling of regret in seeing the meadows thus shorn of their beauty, it can only be a

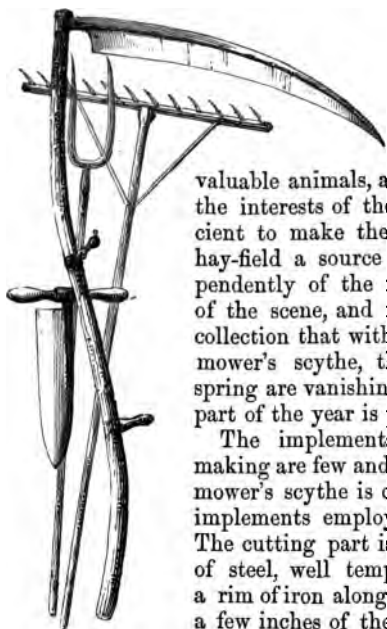
temporary one.

The consideration of the importance of hay as affording nourishment to a great number of

valuable animals, and thus advancing the interests of their owners, is sufficient to make the operations of the hay-field a source of pleasure, independently of the natural attractions of the scene, and in spite of the recollection that with the sweep of the mower's scythe, the productions of spring are vanishing, and the loveliest part of the year is passing away.

The implements used in hay-making are few and well known. The mower's scythe is one of the simplest implements employed in husbandry. The cutting part is a long thin blade of steel, well tempered, and having a rim of iron along the back to within a few inches of the point. This prevents the blade from bending out of its proper shape, which is that of a

*slight curve.* The handle is of wood, and is either straight or crooked, usually the latter; indeed the natural bending



HAY-MAKING IMPLEMENTS.

of a stout stick might often supply the form best suited to the mower's purpose. The handle is fixed at an angle to the plane of the blade, and is adjusted with a nicety on which much of the usefulness of the implement depends. Two short projecting handles are fixed to the principal handle, and by these the scythe is wielded in a convenient manner. The blades of scythes, in other parts of Europe, are mostly made of natural steel, and are so soft that the edge can be hammered to sharpen it and keep it thin. Much time is, in such cases, lost in sharpening the scythe, but it is not so with our implements. These being forged thin, and well tempered, very seldom require the grindstone.

The scythe is by no means confined to the cutting of grass, but is frequently introduced in harvest, in preference to the sickle or reaping-hook. But for this purpose it has what is called a *cradle* attached to it, being a sort of comb, with three or four long teeth parallel to the back of the blade, and fixed in the handle. This cradle raises up the bent straws, and lays the cut corn evenly, so that the harvest people can afterwards easily collect and bind it into sheaves. The common scythe, without this apparatus, will cut oats and barley very well, if they be upright crops, but it is impossible to cut a wheat crop to advantage with the scythe, unless there is a contrivance of this sort for laying it down evenly.

There is also another variety of scythe, smaller than the foregoing, invented for the purpose of harvest work, and called the Hainault Scythe, from a province of that name in Belgium, where it was first noticed. The straggling corn is collected with a hook with one hand, and severed by the scythe with the other, at a single stroke. This scythe is a favourite implement in different parts of the continent, but has never been much used here, although many trials of it have been made both in England and Scotland with favourable results.

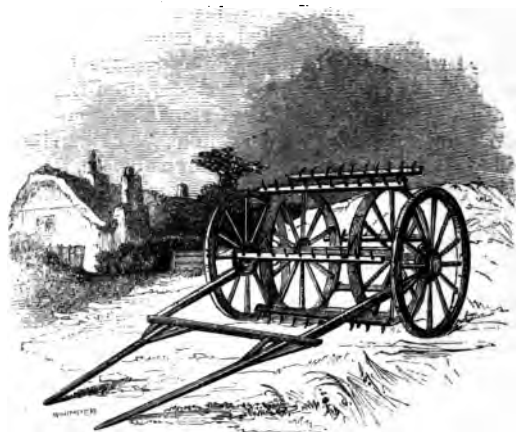
Of these three descriptions of scythe, the first and simplest is that which our mowers use in hay-making. But even this simple implement requires some skill in its management. If you watch the regular movements of a set of mowers, and the wide and easy sweep they take from right to left, as they level successive portions of grass, it may seem no difficult task to do as they do; but if you take up a scythe, and attempt to follow their example, it will soon appear that practice and experience are wanted before you can handle the instrument so as to level the grass without danger of inflicting on yourself some grievous bodily injury. The scythe is a dangerous tool in unaccustomed hands, and many a young beginner has found it so. In this, as in most other cases, however, constant practice, with care and attention on the part of the learner, soon makes that easy which at first seemed difficult, if not impossible.

The hay-rake may seem too simple to require notice, but there are two or three ways of making it, some of which are stronger and better than others, and these need description. The head of the rake generally measures more than two feet across, and is made of hard wood, about an inch and a half in thickness, into which are inserted twelve or thirteen oak or ash teeth, at the distance of about two inches apart; these are properly secured by wedging. The shaft or handle is usually made of ash, neatly smoothed and rounded, and is between five and six feet long, and as slight as is consistent with strength; it being very desirable to have it light. That end of it which is intended to fit into the head is kept square, and let in by a tenon. It is plain that this is not sufficient security for keeping the head and handle of the rake together. Therefore the handle is sometimes split at the bottom, and the two ends then stretched out in a curved form, and made fast to the head at two points. This makes a pretty looking rake, *and has the advantage of being a very light one; but there is still a better form, as regards the strength and*

wear of the implement. This is to adopt the simple mode first described, and afterwards to strengthen it with slight iron rods, fastened one on each side of the handle, a little above the head, and also screwed firmly to the head itself, about midway between the centre and the ends. These are the principal varieties of hand-rake; but on large farms a horse-rake is sometimes employed as a saving of labour. This machine is drawn over the field until it has collected as much hay as can be contained within its teeth or tines, (perhaps twenty or more in number,) and then the driver, by lifting up a pair of handles, raises the teeth from the ground, so as to throw out the contents of the rake. The handles are then lowered, and the work proceeds as before.

With these implements, together with the common hay-fork or prong, the whole process of hay-making is generally carried on. But of late years another and a very important machine has been introduced for the purpose of further abridging the haymaker's toil. This is the *Hay-tedding* machine, invented so early as the year 1800, by Salmon, of Woburn, and now beginning to be used somewhat generally on large farms. It is chiefly valuable for meadow hay, which requires more repeated turnings and scatterings than hay from clover and rye grass. This machine is drawn by one horse, and does its work effectually, whirling and scattering the grass about in such a fashion as must expose every part to the influence of the sun and wind. It consists of an axle and a pair of wheels, the axle forming the shaft of an open cylindrical revolving frame. The bars of this frame are set with iron prongs pointing outwards, each prong being about six inches long and curved. As this frame revolves, the hay is caught up by the prongs, and thoroughly tedded or spread abroad. In the neighbourhood of great cities, where large quantities of meadow hay are made, the tedding machine is of great value, and saves much expense in labour. In *going to and from the field*, or at any time when the

machine is not wanted in operation, the driver is able, by means of a crank, to raise the cylinder of prongs a little way above the ground, so as to keep clear of obstacles. In some cases the same axle and wheels are afterwards made to carry a rake, the tedder being removed to make room for it.



HAY-TEDDING MACHINE.

In our variable climate it is impossible to fix any precise time for carrying on hay-making operations; but, weather permitting, they are performed especially during the months of June and July. In the time of our Saxon ancestors, the latter month was considered the best for gathering in the hay harvest, and they called it *Heu-monath*, or Hay-month. At this time the greater part of the grasses are in flower, and full of those sweet juices which prove so nutritive to cattle. If suffered fully to ripen their seeds they immediately begin to decay, and are far less valuable as fodder. Plants of all sorts, if cut when in full vigour and carefully dried,

retain their several virtues and properties to an amount which has been found nearly double that which they possess when their growth is completed, and when they are verging towards decay. The grasses contain a sugary secretion, most abundant at their joints; but this secretion lessens as the seed ripens, and the nutritive qualities of the plant appear to decrease in the same proportion. There are, however, different opinions on this subject. Some farmers maintain that the hay is more nourishing when the seeds are ripe, and in consequence they defer their hay harvest until late in the season. Others find serious objections to this practice, and say that by allowing the seed to ripen the plant is weakened, the soil exhausted, and the after-grass often rendered deficient.

The business of the hay-field, when once entered on, is carried forward with the utmost activity. The farmer is well aware of the importance of urging on the work while the weather is favourable, and he may therefore be seen personally directing the labours of his work-people; while the servants themselves, if they bring a right mind to the task, are working heartily and earnestly, with a determination to "make hay while the sun shines." First the mowers set out at early dawn, when the dew is thick upon the grass. In beginning to cut the clover or grass of a field, they first notice which way the crop leans, or which way it is carried by the wind at that particular time, for they know that in cutting it down, the work will not be so well or conveniently done, unless the grass lean away from the mower. They also know that they can make better work by mowing across the ridges. These things being settled, and the scythes in good condition, they begin to sweep down the grass at regular distances and in regular order, keeping one a little a-head of the other, and bringing the swathe over towards the left. The small projecting handles fixed to the principle handle of the scythe, are capable of being *moved up or down*, so as to suit the height or conve-



nience of the person mowing. Thus it is that a man can seldom mow well without his own scythe. In order to get a wide sweep our labourers bend their bodies very much in mowing, but in other countries the mowers stand nearly upright, using a long and straight-handled scythe, the end of which passes over the upper part of the left arm.



MOWER.

## MOWING.

Mowing is done by the acre ; but making, that is, tedding, raking, &c., is paid for by the day's work. The number of persons employed makes it necessary to watch all parties, but especially the tedders and rakers, among whom are generally found some idle and awkward hands. An active mower will cut nearly an acre a-day where the crop is good ; with a light crop, he can do more. In skilful hands the scythe is carried so near to the ground in a level field, that little or no waste is made, but a careless mower will leave just the most valuable part of

the grass; for it is well known that an inch of grass near the ground adds more to the weight of the hay than several inches higher up. Thus the farmer is a serious loser if he does not secure the best of mowers, and if he does not also keep an eye on their implements, and ascertain that they are of the right form and well whetted. Bad management in the hay-field has been a source of great loss and waste year after year, but in this respect as in many others, improved methods and greater care are beginning to prevail on all sides.



WHETTING THE SCYTHE.

The mowers having commenced their work at a very early hour, the grass then cut is fit to be shaken up with the forks or tedded during the same morning. If left to the next day, as is sometimes the case, the upper surface becomes brown and withered, and the hay has *lost some of its essential juices*, as well as its beauty of

colour. Therefore, weather permitting, the experienced farmer takes care to have it immediately shaken out and teded, and perhaps thrown about once or twice in the course of the same day. Towards evening the rakers, working in contrary directions, gather it into long narrow rows, called *wind-rows*, and afterwards into small heaps, called *grass-cocks*, in order to preserve it from dew or rain. In this state it is left for the night. These are the first day's operations, and as the mowers continue their toil, there will be, of course, similar work going on in their rear every day. But if you follow the process by which the first cut grass is rendered fit for the stack, you observe that the next day's proceedings are as follows.

As soon as the dew is off the grass, the little heaps of hay or grass-cocks are loosely shaken out to be further dried by the sun and wind, and thus they are left, while the hay-makers go on with the new work the mowers are hourly making for them. In the afternoon, however, the rakers return, and again put up the grass which had been shaken out. They now collect it into larger heaps, called *hand-cocks*. In this state it is tolerably protected from dew or rain, and is thus left for the night. On the third day, it is sometimes carried without further process to the stack; but if not considered sufficiently dry it is again teded, and then gathered into still larger heaps, (sometimes called *colls*,) and carried on the fourth day. In this way the work is carried on, and the process renewed day after day until the fields are cleared. Some descriptions of grass require much more time in drying than others; and this circumstance, together with the many delays occasioned by unsettled weather, often prevent hay-making from being the short and simple process here described; but when all things are favourable, the fields are cleared in a very little time, and the swelling hay-stacks, rising in different directions, *show how earnestly and rapidly the work has been carried on.* The common number of work-people is five

hay-makers to each mower, including tedders, loaders, pitchers, and stackers. Thus a considerable number of persons are engaged in the same field, and their master finds it necessary to be on the alert, directing them, and pointing out the manner in which each person may pursue his labour to the greatest advantage. Without this personal superintendence, half the hay-makers will be idling and wasting their time, and little will be done towards securing the crop. But where due diligence is employed, the hay-field presents a lively and stirring scene.

“ Here the blithe hamlet’s gathered throng,  
With toothed rake and forked prong,  
Maidens and boys in order due,  
The mowers’ ridgy track pursue ;  
Turn with just care the tedded hay,  
Alternate, to the mellowing ray ;  
Or, loosely o’er the sunny mead,  
The scatter’d rows promiscuous spread ;  
Or what may fill the rounded lap  
In smaller heaps collected wrap ;  
Or in more broad and loftier piles  
Build the rich produce ; while with smiles,  
At hand the joyous farmer eyes,  
Safe from the assault of lowering skies,  
O’er the thronged field to stature grown,  
Complete the haycock’s tawny cone.”

It is the frequent reward of this life and activity that the hay-crop is secured in fine order, and is consequently fitter for the nourishment of cattle, and more profitable to the farmer. It is, on the other hand, the punishment of the lazy and negligent, that much of the hay is wasted or impoverished, by being drenched with rain, or suffered to lie too long in the scorching heat of the sun. There can be no doubt that the hay loses in value by being long in the field, yet some persons seem strangely careless of this fact. In Ireland, especially, we are informed that the custom prevails of making the hay into very large heaps, called *tramp-cocks*, or *lap-cocks*, and letting these stand on the ground, in many instances,

until the sward underneath is completely destroyed, and until the bottom part of the hay itself has become mouldy, and some of it rotten. Nor is this the whole of the evil; for the hay, when stacked, acquires a musty smell, and does not possess that refreshing fragrance so acceptable to cattle. The excuse made by the Irish farmers for this apparent neglect is, that the richness of the grass makes it liable to a high degree of fermentation, and therefore renders it dangerous to stack it too soon. But it would appear that a little more diligence in tedding the hay would remove all danger, and be a great saving and improvement of the crop.

In some parts of England, as on our eastern coast, hay-making is deferred, not through any neglect or mismanagement, but on account of the greater backwardness of the crops in such exposed situations. It is a trial of patience to see the crop retarded, or the hay spoiling for want of favourable weather; but this is with us only an occasional evil, and therefore not so bad as the condition of things in Sweden, and even in the western islands of Scotland. On many of the grass-farms in the Hebrides the hay cannot be dried at all without hanging it on trees and shrubs, or on some kind of frame-work where it may be exposed to the full influence of the air. The same method is often needed for the corn in those islands. In Helsingheland there is a machine, called a *hassior*, in common use for drying hay and corn. This consists of upright beams with cross bars passing through them. A bed of hay is first spread on the lowest bar, which is a little raised above the ground. A second bar is then pressed down upon it to keep it in its place, and also to form the support to another bed of hay. A third bar is placed on this, and so on until a convenient quantity is collected, when the whole is covered with straw. In this state *the hay* is sometimes allowed to remain until the beginning of winter.

Much more picturesque is the appearance of our hay-field, where,

“As they rake the green appearing mound,  
And drive the dusky wave along the mead,  
The russet hay-cock rises thick behind,  
In order gay.”

At last the hay is fit to be carried, and busily are all hands engaged in loading and conveying it to the rick-yard.

“Soon the ponderous wain  
Moves slowly onward with its fragrant load.”

Pleasant is the sight and delightful the scent, as the well-laden waggon appears at intervals, passing slowly through the lane, rustling among the over-arching



LOADING HAY.

boughs, and leaving traces of its progress on the foliage. Or, perhaps, the hay is to be stacked in the field, and the journey to its place of destination is therefore a very short one. But wherever the rick is formed it requires the labour of experienced hands to make it *properly*.

The principal person employed is one that is well acquainted with his business; and he has several helpers on the rick, spreading out and treading the hay. In beginning the rick, the state of the ground on which it is to stand is first considered. In a high situation a foundation of fagots is often laid, and is sufficient to protect the hay from contact with the damp earth, which would injure a considerable portion of the bottom of the rick. But in low or damp situations a frame of wood, with bearers for the support of the rick, must be used instead.

Hay-ricks are generally made of an oblong shape, on account of the greater convenience of that form when they come to be cut up into trusses. When well made, the body of the rick swells gradually and equally outwards quite to the eaves, and is thus secured from moisture, and also takes less room to stand upon than would else be required. A rick of a middle size is better than a very large or a very small one, because large ricks are very liable to heat, and small ones have too much outside. From eighteen to twenty-five loads, of about a ton each, is considered a good-sized rick.

Every one knows how liable hay is to ferment and to catch fire, if put together before it is perfectly dry. Great caution is therefore necessary that it may be secured in good order. Besides the danger of actually taking fire, against which precautions might be used, there is the danger of injuring the health of cattle, especially horses, if they are allowed to feed on what is called "mow-burnt hay;" that is, hay which has undergone a high degree of fermentation, until it is of a dark brown colour. If the weather be so unfavourable during the hay harvest, that much of the crop is damaged by the wet, it is an excellent plan to salt the hay as it is stacked. This checks fermentation, and prevents mouldiness, while it renders the hay much more acceptable to cattle. Layers of straw are also *sometimes* introduced among the salted hay, in order

still further to check the progress of fermentation by imbibing the moisture from the hay. And so pleased are the cattle with the flavour of this salted food, that they will eat not only the hay, but even the straw mixed with it, more readily than hay of a better quality which has not been salted. In several of the northern counties of England this practice of salting hay is becoming very common, and the cattle fed on it are found to thrive well. The usual quantity of salt is about a peck to every ton of hay. This may be shaken over the rick from a sieve, or spread in layers by the hand.

There have been several contrivances for rendering the farmer independent, in a great measure, of changes in the weather. One of these is the rick-cloth, a very



THE RICK-CLOTH.

useful article, affording shelter during the whole time the rick is being made. It is set up in the following manner:—

Two light poles, of sufficient height to rise ten or twelve feet above the intended rick, are placed one at each end, and kept firm by three ropes stretching in



different directions, and made fast to wooden stakes driven into the ground. Another rope, extending from the head of one pole to that of the other, connects the two together, and gives further security. To the head of the two poles are also fastened tackles bearing a horizontal pole, over which the rick-cloth is laid so as to form a water-tight roof for the stack. The lower edges of this cloth are either stretched out and fastened to stakes driven into the ground, or if the rick is in progress, they are secured to its sides. This cloth is capable of being raised or lowered according to the convenience of the rick-maker.

When a rick is completed, it is left for two or three days to settle before it is thatched, and at this time the rick-cloth affords valuable protection. The sinking of the rick will be more or less according to the way in which it has been made; but if not slowly built, and well trodden-down, it may be expected to sink two feet. Great indeed is the change from the time the grass is first cut to that when it is ready for sale as hay. In the course of drying it loses no less than three-quarters of its weight; and after this there is further loss in heat and evaporation from the rick. Then again, when it comes to be cut up, trussed, and carried away for sale, there is considerable loss in weight, especially if these operations be carried on during the summer.

It must not be supposed, however, that all heat can be excluded from the rick, or that it would be desirable to get rid of it. A moderate degree of fermentation is necessary to the preservation of the mass: it is called by practical men the "sweating of hay in the stack," and gives a certain flavour to the hay, which is agreeable to cattle, and which also renders it more wholesome. This "sweating" of the hay gives it a somewhat brown colour; but very different from the dark tint of "mow-burnt" hay. In the neighbourhood of large cities there *appears* to be a preference for hay of a fine light colour; *but persons experienced in the management of stock*

find it advantageous to choose a browner description of hay, but yet perfectly free from the two evils of mouldiness, and of being mow-burnt.

Where there is danger, in spite of all precautions, that the hay will heat too much, ventilation is often secured by means of funnels in the interior of the rick : but it is better to avoid this if possible. Much of the hay round these openings is spoilt by mouldiness, unless a thorough current of air is admitted into the rick,—and in this case it is still in danger of fire. The rick, having been allowed to settle for some days, is examined as to its disposition to heat, by plunging the handle of a rake in here and there. When in good condition the loose ends of the hay are pulled off from the sides and ends of the rick, and thatching is commenced.

When funnels are adopted, the best method of making them seems to be as follows:—A channel or gutter, a foot wide and deep, is cut lengthwise in the ground on which the rick is to stand; then two other similar channels are cut across, and all three channels are covered in with faggots, except in the places where two chimneys are introduced. These chimneys are like the common hay funnels, except that they go full home to the earth, and being drawn up as the rick advances, they leave a free current of air through the openings which are in communication with the channels beneath. Thus, whatever may be the direction of the wind, the current of air through the rick is uninterrupted.

It is a goodly sight to observe a well-made rick under the hands of the thatcher. Up to that time there had been risk and danger, every hour, of the spoiling of the crop by the heavy rains which not seldom fall in the hay-making season. But now, all is safe: the substantial hay-stack, properly secured, and in such good condition as to render further anxiety needless, stands a cheering object not only to its owner, but to all who are interested in farming affairs, or in the well-being of cattle. *As we are naturally anxious to secure agreeable,*

wholesome, and nutritious food for our own tables, so must every humane man feel pleasure in knowing that a stock of wholesome provender has been laid up for his cattle. He would wish that the creatures dependent on his care should not only receive that which is necessary for their subsistence, but should also find enjoyment in their food, and thrive well upon it.

The material for thatching a rick is generally straw, drawn straight into bundles, which are handed up, one at a time, on a hay-fork, for the use of the thatcher; but when straw is deficient, rushes, ferns, or other tall wild plants will answer the purpose. Where thatching is performed in the best manner, it is carried on at the same time on both sides of the rick, by two men who begin at the same end, and work from the eaves to the top. They lay the straw on in handfuls, taking care to let each row overlap the former, as in slating or tiling a roof. In this way they work upwards, and to a width that can be conveniently reached with their arms, until they meet at the top, where they lay some straw along upon the ridge. The piece of thatch thus completed is next switched down with a willow rod, and then secured with a straw rope thrown across the rick and made fast to its sides. As the work proceeds, other ropes are stretched, both in a perpendicular and a horizontal direction, interlacing each other, and keeping the thatch quite secure from wind or rain. Where neatness of appearance is greatly regarded, the ends of the thatch are cut evenly just below the eaves, leaving a sufficient depth to allow the rain-water to run off quite clear of the rick. If the situation of the rick is thought to be too damp, a trench of six or eight inches in depth, is sometimes dug round the rick, and nearly close to it, for the purpose of carrying off the water.

When the hay-rick, at a later period, (perhaps in the depth of winter,) comes to be cut up for use, it then *appears* how well and closely packed have been the *contents*. The poet Cowper well describes the cutting of a

hay-rick to supply the wants of hungry animals in winter.

"The cattle mourn in corners, where the fence  
Screens them, and seem half petrified to sleep  
In unrecumbent sadness. There they wait  
Their wonted fodder ; not like hungry man,  
Fretful, if unsupplied ; but silent, meek,  
And patient of the slow-paced swain's delay.  
He from the stack carves out the accustomed load,  
Deep-plunging, and again deep-plunging oft  
His broad keen knife into the solid mass :  
Smooth as a wall the upright remnant stands,  
With such undeviating and even force  
He severs it away ; no needless care  
Lest storms should upset the leaning pile  
Deciduous, or its own unbalanced weight."

The hay-knife employed for this operation (which is represented among the hay-making implements at page 138) is a strong and sharp implement, about two feet and a half long and six inches wide. In using it the labourer mounts a ladder, and cuts perpendicularly through the thatch, leaving the side of the rick from which he has been cutting, literally "smooth as a wall." This is a task requiring considerable strength and some skill. In this, as well as in other farming operations where much mechanical dexterity is required, it is pleasing to observe the skill of labouring men, by whom the cutting-up of the hay and making it into trusses is, in many cases, performed with great nicety and precision. That side of the rick is chosen which is the least exposed to the weather, and, generally, the cutting is begun at the left-hand corner. For tying up the hay, *thumb-bands* are formed of inferior hay, in the following manner:—A wisp of damp hay is held at both ends by a boy, or other assistant. The binder then catches hold of the wisp with the crook of an instrument, called a *windle* or *twiner*, or (in some places) a *throw-cock*.

This tool consists of a piece of iron, about a foot and a half long, with a handle at one end and a crook at

the other. The middle portion revolves in a hollow tube of wood, which the binder holds in his left hand while



WINDLE, OR TWINER.

turning the handle with his right. The size of the portion of hay cut from the stack is decided by that required for the trusses. Each truss is, as near as may be, three feet by two and a half, and thick in proportion to the fineness of the hay—the best being always the thinnest. When the rick has been cut through to the necessary depth, the binder thrusts in an iron spike, so as to lift up the quantity of hay required for one truss. This he places in a weighing-machine, furnished with a fifty-six pounds weight, the hay-bands having been previously laid across in readiness to receive it. The bands are then fastened round the truss, and the binder proceeds to separate another quantity of hay, by means of the iron spike, and to weigh and truss it as before. In this manner a ready workman can manage to truss two loads of hay in the course of a day; while so accurate is his eye as to the quantity wanted for each truss, that he takes from the rick almost the precise weight on each occasion.

So likewise does long experience enable him to judge of the total quantity of hay contained in the rick. Ten solid yards of good and well-settled meadow hay are reckoned to weigh one ton; therefore by taking the length, breadth, and height of the stack, and multiplying them into each other, you can ascertain the weight of the whole. But the farmer's labourer judges more by his eye than by any other guide, and, by constant observation, he is able to guess very nearly at the truth.

*Thus, have we briefly sketched the operations of the hay-field and of the rick-yard; operations which are*

ing the most pleasing and generally interesting of which the return of summer brings before our eyes. If it be asked, "Whence arises the delight which all classes hail the return of hay-making?" may be answered, that the beauty of the season in which it occurs, and the fragrance of the crop itself, have very much to do with the matter; but there is a deeper feeling, and a higher source of pleasure, which have been noticed in the following terms:—

A concerted movement implies a common will; and of itself excites an agreeable sensation in the mind, in that will is directed to some useful object. The pleasure, too, arising from a scheme of utility successfully completed, is another moral element that enters into the feeling. The farmer has sown in hope, he is reaping in joy; and we feel a sentiment of consolation, even where we have no opportunity of expressing it. We place ourselves in his situation, and allow forth to our imaginations what he must feel at consummation of his labours and anxieties." \* \* \* While our sympathies go forth towards our fellow-creatures, in the contemplation of the objects with which we are surrounded, we have but to take another step to connect this feeling with the Author of all that interests our affections, and calls forth our emotions. Such, indeed, is the habitual feeling of the pious mind. He looks to God in everything; and whenever his heart overflows with pleasure, it rises in gratitude and admiration to the Source of all pleasure—his task acquiring new extension, his sentiments additional force and elevation, his enjoyments a warmer and brighter glow."





“Oh ! 'tis a goodly sight and fair,  
To see the fields their produce bear,  
Waved by the breeze's lingering wing,  
So thick they seem to laugh and sing ;  
And call the heart to feel delight,  
Rejoicing in that bounteous sight,  
And call the reaper's skilful hand  
To cull the riches of the land.”

THE approach of HARVEST is justly looked upon with great interest by all classes of persons. The state of the weather, the condition of the crops, the abundance or scantiness of the produce, the prevalence or absence of blight, and other circumstances likely to affect the general prospects of the farmer, are common subjects of remark. Nor should it be otherwise. In the harvest *we are all concerned*, and in the farmer's prosperity



we all, in some degree, share. The sight of fruitful fields should, therefore, gladden the heart of each individual, as it does that of the cultivator himself; and the blessing of a bountiful harvest should raise in every breast a common feeling of gratitude to the Author of all good, who sends us "rain from heaven, and fruitful seasons, filling our hearts with food and gladness." (Acts xiv. 17.)

In the three months previous to harvest there has been more of actual beauty to please the eye, as there has been also greater melody to charm the ear. The loveliness of spring, "when wheat is green, and hawthorn buds appear," when all is fresh, dewy, and bright, and the hand of man has not yet swept away with scythe, or with sickle, the fair produce of the meadows and fields,—that loveliness is not to be equalled, far less surpassed by any of the glories of autumn. Sweetly does Bishop Heber describe a journey taken at this most beautiful of seasons.

"Oh! green was the corn as I rode on my way,  
And bright were the dews on the blossoms of May,  
And dark was the sycamore's shade to behold,  
And the oak's tender leaf was of emerald and gold.

"The thrush from the holly, the lark from the cloud,  
Their chorus of rapture sang jovial and loud;  
From the soft vernal sky to the soft grassy ground,  
There was beauty above me, beneath, and around.

"The mild southern breeze brought a shower from the hill,  
And yet though it left me all dripping and chill,  
I felt a new pleasure as onward I sped,  
To gaze where the rainbow gleam'd broad over head.

"Oh! such be life's journey, and such be our skill,  
To lose in its blessings the sense of its ill;  
Through sunshine and shower, may our progress be even,  
And our tears add a charm to the prospects of Heaven!"

*The beauties of spring have passed away, but the rich*

and sober colouring of autumn, and the wide provision made for the wants of man and beast, inspire a calm and joyous feeling in every well-ordered mind. The most important of all field operations is now about to be commenced; for most of the previous labours of the season have been mere preparations for this,—the great and general harvest. On the successful result of the harvest, the welfare of the whole country depends; and to the diligence and activity of the farmer and his labourers, very much of the success is due. Without this diligence and activity, united with sound judgment on the part of those who guide the operations of the harvest-field, it would be of little avail that the valleys were standing thick with corn, and that the various crops had arrived at a sound and healthful maturity. A little neglect at this critical period, a little want of judgment or of activity in securing the crop, may lead, in a variable climate like ours, to the most mischievous consequences. It is on account of the difficulties connected with harvest work, and the loss arising from bad weather, and other circumstances, that many attempts have been made to shorten the business of reaping by the introduction of machinery. But the reaping machine has never yet been found a perfect substitute for manual labour, nor has it been adopted to any extent. The irregularity of the soil, and the necessity there is for laying down the wheat in regular order, are great obstacles to the action of machinery. The only real method of shortening the processes of harvest is therefore found in the readiness and dexterity of the work-people, and the zeal with which they set about their several tasks.

For two or three months previous to harvest the corn fields have been narrowly watched by the farmer, and all noxious weeds carefully removed. The advice of an old writer \* is acted upon by all wise husbandmen.

\* Tusser.

“ In May, get a weed-hook, a crotch, and a glove,  
And weed out such weeds as the corn does not love ;  
For weeding of winter corn now is the best,  
But June is the better for weeding the rest.

“ The May-weed doth burn, and the thistle doth fret,  
The fitches pull down both rye and the wheat ;  
The brake and the cockle be noisome too much,  
Yet like unto boodle no weed is there such.

“ Slack never thy weeding, for dearth nor for cheap,  
The corn shall reward it, ere ever ye reap ;  
And specially where ye do trust for to seed,  
Let that be well used the better to speed.”



CORN-FLOWERS.

Or, as it is also said by Graham,—

“Now is the time, before the thistle blows,  
While gale is in the flower, and charlock breathes  
Its cloying scent around, the weeding task  
To urge.”

The weeds most disliked by the farmer are those which injure his sample of corn by mingling their seeds with it. There are seldom more than two or three sorts



RED POPPY.

to be discovered in any one sample of corn, but these are too many, and need not be present where due caution is employed. The corn cockle is the principal *weed infesting wheat*. It is in blossom when the wheat

stalks have reached about knee-high, and that is the proper time for getting rid of it. It has a woody stem, and can therefore be easily pulled up by hand. If allowed to remain till the harvest, its seeds, which are black and rough on the outside, are very conspicuous in the samples, and are much objected to by purchasers of wheat, although when ground into flour they are quite harmless, and being white within, they produce flour which is scarcely to be known from wheat flour. In a dry soil the long prickly-headed poppy is often found a troublesome weed, and more generally still, the common red poppy.

In strong soils the hairy tare is often common. This is a weak insignificant looking plant, with clusters of very small pale blue flowers. The seed pods are short and hairy; each pod contains two large heavy seeds, which are difficult to winnow from wheat, when once mixed with it. The stinking May-weed, or camomile, is another pest. This plant has a powerful odour, and is so acrid, that it blisters the skin when much handled. There are also the well-known blue bottle, the common charlock, and the corn marigold. In some places, but more rarely, there is also the darnel, a large grass, supposed to be the tare of Scripture, and whose seeds, when mixed with wheat and ground into flour, have produced serious effects. But instances of this kind are extremely rare, the seeds being lighter than those of wheat, and seldom failing to be separated in the winnowing.

To get rid of all these weeds, the usual means are, to take care in the first place that the corn-seed be perfectly free from them; then to keep a strict watch that not one of these plants be allowed to perfect its seed, either in the field itself, or in the hedge-rows surrounding it; and finally, to vary the crops in such a manner as to allow of the frequent use of the horse-hoe, as well as the hand in weeding. In weeding by the hand, the implements used are the hand-hoe and the weed-hook.

using the former among drilled corn, the weeder occupies a row, and walk abreast. In weeding broadcast wheat, two weeder occupy every single



THE DARNEL.

ge, each taking charge of the half ridge furrow to crown. In using the weed-hook only one hand is employed, and the weeder has no need to stoop at his

task. The handle of the hook is about four feet long and the hook itself is sharpened to a cutting edge both sides; so that the weeder has only to pull



THE WEED-HOOK.

handle towards him in a slanting direction, to cut through the stem of the plant he is aiming at. To cut off the plant before it has perfected its seed is the main object, and it is then left on the ground to decay.

There are many small weeds growing in corn-fields, which are so insignificant as to be little regarded by the farmer; yet these help to impoverish the soil, and the clearer the ground can be kept of them the better will be the harvest.

The term "harvest" applies to the gathering in of all the crops, whether of wheat, barley, and oats, or of beans, peas, &c. But it is with the wheat harvest alone that we are now concerned; and this is by far the most important department of the general harvest. The flour of wheat is more nutritious, and at the same time more agreeable to the taste, than that of any other grain used as food by mankind. It also forms one of the *most ancient* descriptions of food. From the passage in *Scripture*, "In the sweat of thy face shalt thou eat

bread," (Gen. iii. 19,) it is supposed that wheat has existed from the creation; and from another passage, "Judah traded in wheat of Minnith," (Ezek. xxvii. 7,) it is reasonably concluded, that upwards of one thousand years before the Christian era improvements had been made in the culture of wheat, and some superior variety, known as "wheat of Minnith," was in extensive demand. There are also various passages scattered throughout the Old Testament, in which allusions are made to the gathering in of the crops, sometimes with distinct mention of the wheat harvest. The following are a few of them:—"While the earth remaineth, seed time and harvest, and cold and heat, and summer and winter, and day and night, shall not cease," (Gen. viii. 22.) "And Reuben went in the days of wheat harvest, and found mandrakes in the field," (Gen. xxx. 14.) "And thou shalt observe the feast of weeks of the first fruits of wheat harvest, and the feast of in-gathering at the year's end," (Exod. xxxiv. 22.) "Let us now fear the Lord our God, that giveth rain, both the former and the latter in his season: he reserveth unto us the appointed weeks of the harvest," (Jer. v. 24.) "The harvest is past, the summer is ended, and we are not saved," (Jer. viii. 20.) The notices of harvest spread through the New Testament are still more numerous. We can only allude to the striking parable of the tares of the field, (Matt. xiii.) and the description of the general harvest of the earth, (Rev. xiv.) in both of which the occurrences of the wheat field are employed as the figure to represent the final gathering in of all mankind.

A profane writer\* in the time of our Lord makes mention of several kinds of wheat: "The chief and most profitable corns for men are common wheat and bearded wheat. We have known several kinds of wheat; but of these we must chiefly sow what is called the red wheat, because it excels both in weight and

\* Columella.



brightness." At the present time the culture of wheat is very extensive, reaching throughout nearly all the temperate climates of the earth, and also to many of the hotter regions. In some places this crop has been cultivated as high as two thousand feet above the level of the sea, but in our own country it has seldom been grown at a greater elevation than six hundred feet. Throughout this country, and the whole of northern Europe, the most important kind of wheat is that known as *Winter* or *Lammas wheat*. The common varieties of this wheat are distinguished by the colour of the outer covering of the grain, which, according as it is darker or lighter, gives the name of "red wheat," or "white wheat," to the particular variety. Red wheat, including many shades of brown, is considered more hardy than white, and better suited for bleak and exposed districts, but it is in general less productive. A number of local names are given to different varieties of wheat, such as "Golden Drop," "Hickling's Prolific," "White Downy," "Hunter's White," &c.; and it is for the cultivator himself to judge which kind of wheat is most suitable to the situation and soil it is intended for. Winter wheat is generally sown in Autumn, but is sometimes called spring wheat, from being sown at that season. It is, indeed, common to class as spring wheat every kind of winter wheat which will ripen when sown after turnips in February. There is, however, a distinct species of real spring or summer wheat, much used in warm countries, but little known in our own. It is occasionally used to repair the ravages of the wire-worm, being sown in April or May, in the bare spots caused by the worm in the winter crop. It is generally ripe as soon as the rest, and can be threshed and sold with it; but it is inferior both in quality and productiveness to winter wheat. Thus it appears, that the various sorts of spring wheat in common use, do not form a distinct species from Winter or Lammas wheat, but have merely acquired a somewhat different habit,

from being constantly sown in Spring. For it is a curious fact that Winter wheat, if sown in Spring, year after year, acquires a habit of ripening earlier than the same wheat sown in Autumn. Therefore the farmer when he sows in Spring, chooses the seed of



HICKLING'S PROLIFIC.

HUNTER'S WHITE  
WHEAT.TALAVERA WHITE  
WHEAT.

wheat which has been already sown in Spring,—not the seed of Autumn-sown wheat.

It is impossible to notice the numerous varieties of wheat in cultivation in this country, but we may briefly describe one or two foreign species. Egyptian, or many-spiked wheat, differs from all other kinds in having a

compound ear, composed of several spikelets. In native country, and also in Italy, it produces six or seven ears on one stalk; but when grown in unfavorable circumstances, it degenerates and assumes the



BEARDED WHITE TUSCANY  
WHEAT.

EGYPTIAN WHEAT.

SPELT WHEAT.

pearance of ordinary spring wheat. It would probably be cultivated to some extent in the warmer portions of this country, if the form of the ear did not cause it to hold the wet at harvest time, and thus to receive damage.

The peculiar growth of this kind of wheat explains

what might otherwise appear unaccountable in the Scripture narrative of Pharaoh's dream, where both the good and bad wheat are said to have borne seven ears on one stalk.

Spelt-wheat, supposed to have been the *triticum* of the Romans, and the *zea* of the Greeks, is extensively grown in the south of Europe, and also in the north of Africa. It has been cultivated in Scotland six hundred feet above the level of the sea; and has the advantage of growing upon a much coarser soil than other wheat, and also of requiring less culture. But the bread made from it is of a dry quality, and the wheat has chiefly become celebrated in commerce from the excellent starch and flour made from it, especially at Nuremberg and Frankfort. This wheat is said to be better adapted for culture in Australia than any of the more delicate kinds.

Single-grained wheat, or St. Peter's corn, is a curious species, chiefly cultivated in the mountains of Switzerland, and other elevated places. It is fitter for being boiled into gruel than made into bread, and the ear is so regular as to have the appearance of being carved in ivory. Polish wheat was at one time partially cultivated in England, but does not appear to merit general notice.

It is a cause of much anxiety to the farmer that the wheat crop is more liable to be affected by casualties than any other crop whatever. Every part of the plant is subject to the attacks of insects, or to the growth of some destructive fungus. Scarcely is the grain committed to the earth, and vegetation commenced, ere the caterpillar of the *wheat dart-moth* commences its ravages, feeding on the young root in Autumn, and never appearing above ground except in the night. On the arrival of Spring another enemy appears in the *wheat stem-fly*, which deposits its eggs in the very core of the young plant, so that the primary shoot affords food to the *larvæ*, and is completely destroyed. Were it not for

the wonderful power of multiplication possessed by grain-bearing plants, this insect would soon effect the destruction of the crops. But such is the vigour and activity of the root, that it often sends up a dozen



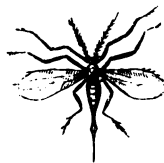
WHEAT-STEM-FLY.

stems and ears to repair the mischief; thus the apparent enemy becomes a friend, in promoting what is called the *tillering* of the wheat. The fly itself is black on the upper parts of the body, and pale yellow beneath; the maggot is small and white.

At a later period appears a much more formidable insect, called the *wheat-fly*, or *wheat-midge*. Myriads of these insects may be seen in wheat fields, just when the



WHEAT-STEM-FLY.  
*Magnified.*



WHEAT-MIDGE.  
*Magnified.*

ears of corn are bursting from their leafy covering; this generally happens in the early part of June, and then it is that the wheat-fly deposits its eggs in clusters of from two to twenty on the blossom of the wheat, choosing the evening hours for the performance of this operation. The larvæ are hatched in about ten days, and immediately begin to feed upon the pollen, which gives them a yellow colour. These creatures are exceedingly small, and might be considered insignificant, were it not for the effects they produce. Attacking the wheat in vast numbers (as many as forty-seven have been counted in a single floret), they completely destroy its fertility, and cause the grain to shrivel and decay, at the very time, perhaps, when the farmer had been congratulating himself on its promising appearance. The colour of the wheat-fly is reddish yellow; the wings are longer than the body, rounded at the tip, and of a whitish hue, with coloured reflections. In a calm evening, these insects fly about in undulatory clouds, much in the same manner as gnats.

A partial remedy for this evil has been providentially given, or the loss of valuable crops would be far more complete than it is. Minute as are the bodies of the *caterpillars* of the wheat-fly, they are nevertheless

selected by a very small four-winged black fly, called an *ichneumon*, as a place in which to deposit its eggs. In July and August the ichneumon busily explores the wheat ears, and when it finds one infested with these caterpillars, it insinuates itself between the chaff, pierces the body of the caterpillar by means of a sharp point at its tail, and deposits a single egg in every one it is able to reach. In a short time this egg is hatched, and a minute maggot begins to feed on the internal parts of the caterpillar. In this way the ichneumon effects the destruction of a vast number of caterpillars, and is the instrument of saving a large portion of the crop. There are three kinds of ichneumon which ply this useful task of destroying the caterpillars of the wheat-midge. The chrysalis of the wheat-midge often lies secreted during winter among the chaff, and it has been suggested that multitudes might be destroyed by burning or scalding the chaff after the grain has been threshed out.

In addition to the insects already named, there is the destructive *wire-worm*, which continues in the larva state for two or three years, and is busily at work during nearly the whole of that period feeding on the roots of plants. Where wheat is sown upon clover leys, old pastures newly broken up, or pea and bean stubbles, it is often attacked by this insect, and sadly wasted by it. The wire-worm is the grub of an insect called the *click-beetle*, from the power it has of springing to a considerable distance with a clicking sound. As a grub, this insect is of a long worm-like form, and tough skin, and of a deep yellow colour, except the head, which is brown. Diligent hand-picking has been successful in getting rid of this creature when it infested turnips; as many as fifty worms having been found in a single turnip. It is, also, perhaps, the best method in the case of wheat, but other remedies have been suggested, such as the sowing of white mustard-seed in the infected field, or the burying of slices of potato fixed on skewers, which are pulled up at intervals and the worms re-

moved ; also watering the land with a strong saline solution, or leaving the land fallow and perfectly free from weeds, until the enemy is starved out. The ravages of the slug must also be named among the attacks to which wheat is liable ; these are chiefly carried on when the crop has been sown in autumn after clover and beans.

Another serious evil is known by the name of *ear-cockle*, *purples*, or *pepper-corn*, because the grain, when infected by it, becomes nearly black, and is also rounded in shape something like a pepper-corn. Upon opening these blighted grains they are found to be full of a moist white cottony substance, which has taken the place of the flour. When this cotton is examined under a microscope, it is found to consist of a multitude of small active creatures, twisting and writhing about like so many eels or snakes. When a sound grain of wheat is sown by the side of one infected, the young plant suffers no injury until about the month of March, when the animalculæ begin to find their way from the blighted grain into the earth, and thence into the young corn. They gradually ascend within the stem till they reach the ovule (or young state of the seed) in the flower-bud, even before the ear has shown itself. It has been supposed that they do not increase in size till they have reached the young seed, but then grow rapidly, deposit a large number of eggs, and die. It has been calculated that fifty thousand young might be packed into a moderately sized grain of wheat. It is an astonishing fact, that if a mass of these animals be so perfectly dried that the slightest touch would reduce them to powder, and kept six or seven years in this state, if moistened with a drop of water, they speedily revive and become as active as ever. Professor Henslow, who gives these particulars, recommends that the seed supposed to be infected with this serious evil should be scalded in water, but not to an extent which shall destroy the germinating powers of the grain.



It might be supposed that when once the wheat is fairly housed in granaries, it must be quit for ever of its insect enemies; but here another evil besets it, in the form of the *grain-weevil*. This is a small beetle, the female of which deposits her eggs upon corn in granaries. The young larva burrows into the grain, eating the interior, and afterwards escaping in the perfect form through a very small puncture, which leaves the grain to all appearance perfect, while it is really nothing more than an empty shell. The best preservative against this evil is perfect ventilation, and a constant sifting of the grain.

Another pest of the granary is the *corn-worm*, the caterpillar of the corn-moth. The perfect insect appears as a small moth in May, June, and July, frequenting granaries, and flying about only at night. It attacks rye, oats, and barley, as well as wheat, fluttering about the grain and depositing its eggs. In a few days small whitish maggots are hatched, and these soon penetrate the grain, closing up the hole by which they enter, and then feeding upon the interior. When about to change into the chrysalis state, the maggot issues from the grain and hides itself in cracks and fissures in the floor, where it remains until the spring calls it forth in the perfect form. Sprinkling the floor with strong white-wine vinegar and salt, is recommended as a precaution against this enemy of the grain.

Besides all these enemies among insects, the wheat crop has others among plants. *Rust* and *smut* are only common names for two varieties of parasitic fungus, which derive their sustenance from the chaff-scales of wheat, and from the grain itself. The former is of an orange-yellow colour, and is chiefly found scattered over the inner surface of the outer chaff-scales, which it raises into blisters. Smut is a brownish black dust, filling the kernel of the wheat with a greasy and stinking powder. It soon causes the seed to swell, and to show evident tokens of disease. These two sources of mischief are, however, less serious than mildew, which seems to attack

the whole plant, and to deprive it of the power to form healthy seed. The straw also is of a pale sickly colour, and is easily cut to pieces on being thrashed. There is a very common opinion that barberry bushes have some connexion with mildew in wheat, for it has been observed that fields of corn in the vicinity of these bushes suffer more than others. This has been so often asserted by respectable observers, that it is vain to treat it as a mere vulgar prejudice; and we may rather seek to account for the fact (if such it be) by supposing that the barberry itself is very liable to mildew, and that when attacked by this disease, it communicates it to the surrounding crops. There is yet another disease, and that of a most extraordinary kind, called ergot; but this chiefly affects rye, and cannot therefore be fully noticed here. It is a monstrous enlargement of the grain, of a spongy texture internally, and containing much oily matter. The effects of ergot, even when mixed in small quantities with good flour, are most disastrous to men and animals.

The number of diseases thus suffered by grain in all its stages, and by wheat in particular, has led to the practice of steeping seed-corn in some powerful briny solution capable of washing away or destroying the particles of fungus, &c., which may be adhering to the grain. This practice is almost universal, and cannot be neglected with safety. These precautionary measures are more easy and more sure, than any remedies which can be applied when once disease has made its way among the crop. Having thus described the chief enemies of the wheat crop, let us return to the immediate business of the harvest.

All needful care having been bestowed on the state of the crops during previous months, the farmer is now about to reap the fruit of all his labour. All is preparation and activity. Few are the hours of daylight which are given to sleep, or to recreation; for the active *man well knows* the value of early rising, and of in-

cessant industry at this important time. He is ready to say, with one of our old writers, "Experience of mine owne, and conference with the wise, hath taught me this for truth, that early rising maketh a man whole and sound in bodie, quicke in wit and memory, and rich in substance." Accordingly he is up and stirring at the dawn of day, and his labourers, following his good example, are equally on the alert. It is *their* harvest as well as his; their wages are higher, and they look forward to many an additional comfort, or to the means of paying off unavoidable debts, when they shall have received their "harvest-money."



THE SICKLE.

The implement used in reaping wheat is either the sickle or the scythe, but most generally the former. The sickle is a simple, but very efficient tool, and has been in use from ancient times. The sickle of our forefathers was serrated, or finely toothed at the edge of the blade; but that more generally preferred at the present day is smooth-edged and very sharp, and is also longer and broader than the old form.

The blade is principally of iron, but with an edging of steel. The curve of the blade is considered a matter of great importance, there being a certain form which gives the muscles of the right arm less cause for exertion than other forms, so that by using it the reaper is saved much unnecessary fatigue and toil. The accompanying illustration shows one of the best forms of sickle now in use.

In reaping with the sickle there is very little waste, and the corn is laid in a regular and even manner, which is of great importance with this valuable crop. The work can be carried on by both men and women;

but when the scythe is used in reaping, men only are equal to the task, which is a very laborious one. In this, as in all other farming operations, very different degrees of skill are shown by the work-people. In some cases the reaper may be seen merely bowing his body towards the ground, and drawing the sickle upwards at every stroke, in the direction of his knees. This attitude causes him to make very bad work, and to leave the stubble in a series of notches. The position of a good reaper, at his task, is not very easy to describe, but is seen in a moment to give him every advantage, and to enable him to leave an even and a clean field. Crouching down on his right leg, and extending the left to steady himself, he seizes small portions of corn with his left hand, and holds them, while with his right he draws the sickle across their stems as near to and parallel with the ground as possible, pulling it towards him as he does so. Without changing his position, he now makes a sort of creeping movement towards the left, and cuts another portion of corn, which is gathered as before in the left hand. He proceeds thus until he has cut as much as can well be kept together with the left hand, when he lifts it up by the aid of the sickle, and lays it on a band made of corn stalks, which is used to bind up the sheaf. Another person follows the reaper, for the purpose of making the sheaves. The reaper's art seems chiefly to consist in making a sweep with his sickle which shall be as near the ground as possible, and also parallel with it. This cannot be done without bringing the body into the crouching posture just described, for by stooping merely the shoulders and back, the arm is not brought low enough to take an even cut.

The old form of sickle, with a jagged edge, is still preferred by many labourers, especially the Irish. The smooth-edged sickle (oftener called *the reaping-hook*), when in the hands of a good reaper, cuts closer to the ground, and leaves a smoother stubble. There is one

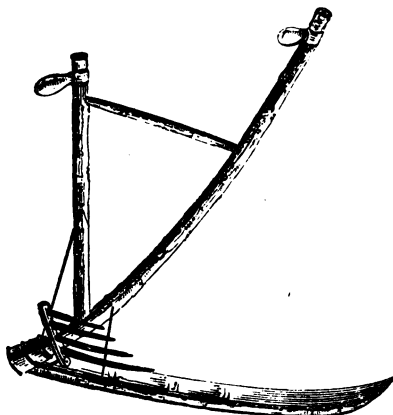
drawback, however, to its use, in the frequent sharpenings it requires, and the loss of time thus incurred. The reapers generally work in bands of about half a dozen together, headed by an experienced hand. The bandster, who follows them, ties up the sheaves, and places them upright in *stooks*, upon the middle of each alternate ridge. This is the general process of reaping wheat in England; but in many districts the scythe has been lately introduced in preference to the sickle. Where the crop stands up well, and time presses, there may be great advantage in mowing instead of reaping corn; but it is very doubtful whether any satisfactory result would be obtained from a general use of the scythe, except in the case of oats and barley, for which it is already commonly used. The wheat crop is so valuable that the most careful method, and that which admits of the least waste, should always be preferred. Now, unless there is much dexterity in the work-people, and much good management on the part of those who superintend them, there cannot fail to be waste, and also rough work, in mowing wheat with a scythe. A prudent farmer never abandons an old method, which he has found to work well, for a new one which he is not quite master of. Such conduct would create discontent and ill-temper among his labourers, and thus greatly thwart his purposes throughout the whole harvest. But when fully persuaded that a change is desirable, he must exercise his judgment to bring it about with the least possible disturbance of the usual arrangements. Harmony and good understanding, always desirable, are never more necessary than during this busy season.

Where the scythe is adopted instead of the sickle, strong and able workmen are necessary; the task being one of the hardest known in agriculture. And they *must* possess dexterity as well as strength, otherwise *they* will only make confusion in the field. The nature of *his* implement prevents the scythe-man laying the

corn evenly on the bands; therefore another labourer follows for that purpose, while a third binds up the sheaves. A fourth person follows, and clears the ground of loose corn with a large rake. Mowing corn is generally done by means of the common scythe, which, if



THE CRADLE SCYTHE.



TWO-HANDLED CRADLE SCYTHE.

made of good materials, and strengthened with a plate of iron along the back, will answer the purpose for heavy crops: but where the crop is light, an apparatus called a cradle is fastened to the scythe, for the purpose of collecting the corn and laying it down evenly. This

cradle consists of three slender rods of ash, slightly bent, and mortised into a piece of wood which is attached to the lower part of the handle. These rods are of unequal length, the uppermost being about two feet long, and the others gradually diminishing. In place of this common form of scythe there has been recently introduced one with two handles, which is said to place the mower in a less constrained position, and therefore to be more easily worked.

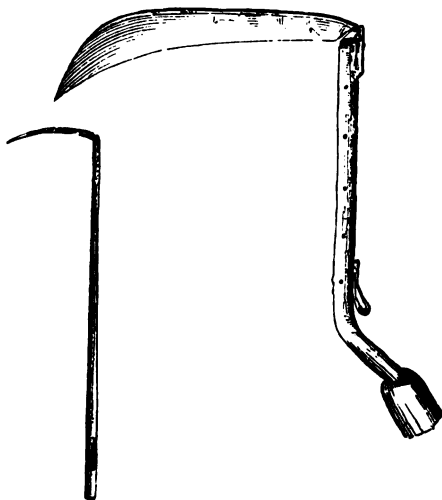
The following illustration displays the modes of reaping with the different forms of scythe mentioned.



REAPING WITH THE SCYTHE.

The advantages of mowing corn by the scythe are, that where the ground is level, it is cut closer to the *earth* than can possibly be done with the sickle, and *thus* a considerable quantity of straw is gained. It

also reduces the employment of women in the harvest-field, and is a cheaper method of getting in the crop than reaping with the sickle. It likewise causes the sheaves to be more loosely packed, and the corn to be less in danger of sprouting, or growing out, than when handled and closely pressed together as it is by the



THE HAINAULT SCYTHE.

reaper. The disadvantages of mowing corn are, that if clover or any other crop is sown with it, the scythe cuts nearly all that has grown, and makes the harvest hazardous. There is also more trouble and difficulty in setting the corn up in stooks, and the appearance of the field is often slovenly. Wheat that has been mown takes more time in carrying, and more space in housing. Where the land is foul, the scythe cannot be made to  
*answer.*



In order to lessen the laborious nature of the task of mowing corn, there was an attempt some years ago to introduce the Hainault scythe, a small implement consisting of a bent portion, or hook, to be held in the left hand, pressing upon the corn, and a scythe held in the right hand by a handle, the forefinger being thrust through a leather loop. In using this scythe, the reaper stepped backwards as he made a series of strokes against the standing corn, and drew the cut portion towards him by means of the hook. Two young Flemish farmers were brought over by the Highland Society in 1825, for the purpose of instructing the labourers of Scotland in the use of this scythe, which was reported to be the means of saving from one-fourth to one-third of the usual expense of reaping by the sickle. Nevertheless, the Hainault scythe has not made its way in this country, nor is it deemed equal to our cradle-scythe.

Whether by scythe or sickle, the business of the harvest goes rapidly forward, and is the grand object of attention while it lasts. Every other occupation gives way to it; indeed, the best managers have taken good care that nothing shall interfere with their task, by clearing off all other duties as far as they were able. If the villager is working harder than usual at his garden, or his little allotment of ground, it is to get it all in order "before harvest." If an unusual display of linen whiten the hedges, or flutter in the breeze, it is a sign of the general wash undertaken by good housewives just "before harvest," that they may have the less to do during that important season. If there be an unusual preparation and whetting of tools, a sweeping out and repairing of barns and stack frames, and a careful collection of such articles as may be wanted to repair any damage in the field, it is all with the same object of preventing interruption when once the reaper's task has commenced, and when every hand is wanted in the field. *The farmer himself also (unless he has a competent steward) takes care to be absent as little as possible from*

the scene of operations. Visits and journeys are postponed, the markets, for a time, unattended, and all his energies are concentrated in his corn-fields. If he knows his own interest, he constantly superintends his different bands of reapers, marking the time for them to begin their tasks, and to end them. He restrains and directs hasty and careless hands, while he urges on the slow and cautious. It is his care that the ground shall everywhere be well cleared, and the crop secured in the best condition which the weather and other circumstances will permit. Thus the corn-field is a busy and interesting scene, and such it appears equally to have been in the days of the poet Homer, who wrote thus:—

“ Here stretched in ranks the swelled swathes are found,  
Sheaves heap'd on sheaves here thicken up the ground;  
With sweeping stroke the mowers strow the lands,  
The gatherers follow and collect in bands;  
The rustic monarch of the field describes,  
With silent glee, the heaps around him rise.”

When the bandster has collected a sufficient number of sheaves, he proceeds to set up the stook, or shock. Taking two sheaves, one in each hand, he sets them a little way apart on the ground, but brings the heads together. In the same manner he sets up others, until a double row of sheaves, seven in length, is set up, each pair supporting itself, and not leaning against the next, although close to it. In the case of barley and oats, the stooks are frequently *hooded*, that is, covered in by sheaves placed at the top, and spread out in an inverted position. But wheat, which does not remain long in the field, is seldom protected in this manner.

All the processes of harvest are pleasant to behold, and inspire feelings of gladness and contentment. The prophet Isaiah, in describing a high degree of thankfulness and joy, says, “They joy before thee according to the joy in harvest” (Isa. ix. 3); and this grateful sense of benefits conferred is the right feeling with which we *should regard the scene*.

" 'Tis fair to see the reapers clasp  
The corn in their capacious grasp ;  
The armful's close collected heap,  
Sheer with the crooked sickle reap,  
And on the earth's rich bosom throw ;  
Meanwhile, along each prostrate row,  
Their faithful partners close behind  
Track their advancing steps ; and bind,  
With twisted wreaths of stalks new shorn,  
The bundles of the golden corn,  
Where rang'd in seemly guise appear  
The upright straw, the bending ear.

'Tis fair to see the farmer build,  
Now here, now there, throughout the field,  
With measuring eye correct, that leaves  
Fit space between, the number'd sheaves  
In shocks progressive. As he piles,  
The still increasing heaps with smiles  
He counts, and feels his heart run o'er  
With gladness at the growing store :  
But ill received, unless repaid  
With thankfulness to Him, who made  
His sun arise, His rain descend ;  
And for the good He deigns to lend,  
Reserves a part Himself, decreed  
The stranger and the poor to feed."\*

While the corn is thus passing through many hands in the course of its preparation for carrying, it will greatly depend upon its state of ripeness whether the grain remain firm in the ear, or whether much of it drop out and be wasted. Many farmers adopt the practice of reaping about a fortnight before their wheat is ripe, both for the sake of preventing waste, and also to secure a better quality in the straw. The tokens of ripeness in corn are few and simple. When the straw is of a bright golden colour from the bottom of the stem nearly to the ear, or when the ear begins to bend towards the earth, it is time to cut the crop. It is seldom that a crop ripens all alike, and there will often be green ears in one portion of a field, when there are mature ones everywhere else. But these green-looking ears will often be

\* Bishop Mant.

found capable of being separated from the chaff if rubbed in the hands, and if so, they may be safely reaped, and will become fully ripe while standing in sheaf. Small sheaves are preferred to large ones, especially if the season prove rainy. They are soon dried after a storm, and are, therefore, less liable to damage. When wheat is secured in a really good condition, the grains, whether the crop be of red or white wheat, are plump, with a fine smooth skin, and a bright colour, free from specks or cloudiness. In the best samples the grains are also of uniform size, without bruises or holes. When hard and flinty, they are sometimes preferred by the common baker, as affording what is called strong flour; but for finer purposes the grain should be quite opaque. A mixture of the two kinds of grain is said to make superior bread. The purchaser is seldom so little experienced in his task, as not to be able readily to detect damaged wheat. When it has been heated in the stack, he readily discovers in it a bitter flavour; and when it has been in salt-water, he finds a saltiness of taste. If artificial means have been employed to give the grain a round and plump appearance, a quick eye will speedily discover that the ends have been rubbed down. If it is old stock, and has lain long in the granary, a dull and dirty appearance, or a musty smell, will betray the fact. And if it has suffered from the attacks of that insidious enemy, the corn-weevil, its deficiency in weight, and also the holes bored by the insect in making its escape, will plainly reveal the mischief.

When wheat is in a fit condition for carrying, it is brought home load by load, and formed into stacks. The foundation of the stack is generally made on a platform of wood or iron, in order that this valuable grain may not suffer from the moisture of the soil, or the attacks of rats or mice. Of late years a frame made entirely of iron, and supported upon iron columns, has been introduced, and much approved. It can be *readily taken to pieces, and put together when wanted,*

which makes it very advantageous for a temporary purpose. When the platform is of wood, as a further precaution, the props are often soaked in corrosive sublimate. This answers the double purpose of preserving the wood and destroying vermin. Stacks of corn are of various shapes and sizes, but it is thought that a long, narrow, square shape is the most advantageous, especially where the quantity is very considerable. This shape is readily and conveniently built, it stands firm, and preserves the grain well; it has also the advantage of requiring less thatch than some of the other forms. But perhaps the most usual form of wheat-rick is the circular one, with a conical roof. The best way of managing wheat is undoubtedly that of thus stacking it with the straw; and when the latter is required for use, to dispose of the wheat immediately at the current market prices. But it happens of necessity, that granaries, or places for storing corn, are also requisite. The ancients used to preserve their wheat for many years in storehouses especially built for its reception, and in all ages of the world such places have been constructed of different materials, according to the facilities of the spot in which they were required. Thus in the time of Joseph, wheat was stored in Egypt for seven years, and was doubtless preserved for so long a time without difficulty in that dry and warm climate. The granaries of the ancients were sometimes mere pits dug out in the ground; at other times barns or storehouses were built for the purpose. "I will pull down my barns and build greater, and there will I bestow my fruits and my goods," was the exclamation of the rich man described by our Lord, whose ground "brought forth plentifully." (Luke xii. 18.) Among the Romans the necessity of preserving grain was so strongly felt, that they took the greatest pains in constructing their granaries, and are said to have kept wheat in them for fifty, or even for a hundred years. "The best situation for a granary," as described by a recent authority, "is over the thrashing-

floor. It may be easily secured from vermin; and requiring only six feet in height, it will not interfere materially with the bays of the barn, especially if they be loaded through the gables. A trap-door in the floor, with a roof and pulley, raises and lowers the load in the most easy manner, besides securing it more effectually from depredators, and strong wired windows at each end ventilate it sufficiently." Very cold, or very hot weather, with a dry state of the atmosphere, is favourable to the preservation of grain; but moist and close weather is very much the reverse. Frequent turnings of the wheat are recommended to keep it from the attacks of the corn-weevil, and to promote ventilation; but the practice of farmers differs in this respect. While some are in the habit of shovelling the whole of the wheat from bottom to top every few weeks, others do not turn their wheat at all, but leave it in thick masses reaching from the floor to the ceiling, and keep it quite in the dark, in order to preserve freshness of colour throughout the mass.

But to return to the corn-field. As soon as the last load of sheaves has been removed, the field again becomes a busy scene of industry; for at that time are generally admitted the wives and children of the labourers, eager to glean the scattered ears of corn that have been left.

"The gleaners spread around, and here and there,  
Spike after spike, their scanty harvest pick.  
Be not too narrow, husbandmen! but fling  
From the full sheaf, with charitable stealth,  
The liberal handful. Think, oh grateful think!  
How good the God of harvest is to you,  
Who pours abundance o'er your flowing fields;  
While these unhappy partners of your kind  
Wide-hover round you, like the fowls of heaven,  
And ask their humble dole. The various turns  
Of fortune ponder; that your sons may want  
What now, with hard reluctance, faint, ye give."

The practice of gleaning, or, as some call it *leaving* is of great antiquity, having been derived from Scrip-

ture times, and enforced by Scriptural injunctions. "And when ye reap the harvest of your land, thou shalt not make clean riddance of the corners of thy field when thou reapest, neither shalt thou gather any gleanings of thy harvest; thou shalt leave them unto the poor, and to the stranger." (Lev. xxiii. 22.)



GLEANERS.

"When thou cuttest down thine harvest in thy field, and hast forgot a sheaf in the field, thou shalt not go again to fetch it; it shall be for the stranger, for the fatherless, and for the widow: that the Lord thy God may bless thee in all the work of thy hands." (Deut. xxiv. 19.) The spirit of these merciful injunctions is still acted upon, although they are not observed to the letter. Year after year the cheerful gleaners still go forth at early morn, and towards evening return laden with the fruits of their industry. Too often, indeed, has the bad conduct of the poor shut them out from this benefit. Taking it as a matter of right, instead of as an act of kindness on the part of the owner of the fields, they have shown so little gratitude, and have

been so little careful to avoid trespassing on forbidden ground, that they have known what it is to be denied the privilege of gleaning for the future. The poor are not aware that, according to the law of the land, they have no right whatever to this benefit ; and that they owe it entirely to the bounty and good feeling of the proprietor. Few indeed are the examples of a farmer wantonly depriving his poor neighbours of the privilege of gleaning in his fields: the express injunctions of Scripture would weigh with him, if the common feelings of humanity did not prevent so harsh an act. But in most cases, at the present day, the farmer finds it needful to have the fields cleared of sheaves before the poor are admitted, and thus to remove the temptation to theft and dishonesty. The poet's recommendation to "fling from the full sheaf the liberal handful," is indeed seldom acted upon ; for the gleaners have shown so frequent a disposition to take the liberal handful unbidden, that it has shut out from them the compassion of the kind-hearted farmer, and has introduced a stricter discipline with respect to the gleanings of fields.

Last of all comes the harvest-home, that vestige of good old times, which every kindly disposed person would wish to see preserved as a custom of our land never to be slighted or forgotten. It is not so much the value of the entertainment itself, as the kind and friendly feelings promoted by it, that must be regarded. No gratuity bestowed as a substitute for this meal can make up for the loss of all those grateful and affectionate feelings, called into play by the exercise of old English hospitality on the part of the farmer and his family. The writer has often been present at these rural feasts, and is convinced that, if well conducted, they form one of the most powerful means of fostering contentment and good feeling between masters and their dependents. It is a pleasant thing to witness the *preparations for this*, the most important of annual



festivities, when the principal labours of the year are brought to a close, and the "last load" has been conducted home in triumph. Perhaps it is in some capacious barn that the feast is to be held. Willing hands have been busy during the forenoon hiding the bareness of the walls, by hanging up a tapestry of carpeting and evergreens, while the capacious doors have given place to an arch of mingled evergreens and flowers. Long narrow tables, neatly covered with white linen, and furnished with benches for the accommodation of the guests, occupy in a double row the whole length of the barn. Thither repair, at about five or six o'clock in the afternoon, the happy villagers, dressed in their Sunday clothes, and looking all contentment and smiles. They have leisure to admire the pains that have been taken for their accommodation, while the cooks and helpers are getting ready the steaming viands, which diffuse a tempting odour all around. Nor is the decoration of the barn a matter to be despised; it gives proof that the farmer's household take pleasure in the feast, and seek the pleasure and enjoyment of their poorer neighbours. Many cottagers are remarkable for their love of flowers, and display considerable taste in cultivating them near their dwellings; and when they see that their master is not only willing to feast them, but to gratify their eyes and fancy, they feel that they are treated not as mere animals, whose appetites alone are to be consulted, but as beings who have feelings and sentiments in common with his own. And when the good fare is spread before them, and the master, after reverently asking a blessing, and listening to their hearty responsive "Amen," has commenced, with needful help, the arduous task of carving for his guests, the villagers, old and young, look round with manifest pride and pleasure, when they see the farmer's family and friends taking an active part in bearing to each the abundant portion, and in attending to all the wants of their guests. The tokens of mutual good-will on these

occasions are delightful to witness. The hearty enjoyment of the feast, the rustic songs that follow, and the vociferous cheers with which the hospitality of the master and mistress is celebrated, are welcome signs to those who desire the labourer's welfare; and it only requires a little firmness and judgment on the part of the master to prevent the harvest-home from degenerating into a scene of drunkenness, and to preserve it, as it ever ought to be, a true specimen of British hospitality and enjoyment, and a powerful means of promoting harmony and good-will.





THRESHING IN THE  
VALLEY



~~~~~

“Tis stillness all. No rustic sound
 Disturbs the air's repose profound ;
 Unless the due repeated flail,
 Or quick brush of the winnowing sail,
 Give sign that toil is busy now ;
 Though high above the buried plough
 Lies the piled heap ; nor from the stall,
 Obsequious to the herdman's call,
 Go forth the kine and crowded sheep :
 More pleased the well-stored crib to keep,
 And homestead, than to hunt their feed,
 Precarious through the snow-clad mead.”

~~~~~

winnowing is the wholesome activity of the farmer's life, that there is not a day in the year which need be spent in idleness. In the most dreary seasons, when storms of wind and rain, or heavy falls of snow, put a stop to all

field labour, when the plough and the spade are equally inactive, and when most other rural implements are for a time laid aside, the cheerful sound of "the wide-resounding flail," still announces to the whole village or neighbourhood that industry has not ceased, and that the threshers are preparing, by their laborious work, to supply the wants of the cattle in providing them with abundance of fresh fodder, and at the same time to afford to their master a due supply of grain for the market. A pleasant picture of this rural occupation has been thus drawn:—"The busy flail, which is now in full employment, fills the air about the homestead with a pleasant sound, and invites the passer by to look in at the great open doors of the barn, and see the wheat-stack rising to the roof on either hand, the little pyramid of bright grain behind the threshers, the scattered ears between them, leaping and rustling beneath their fast-falling strokes; and the flail itself flying harmless round the labourers' heads, though seeming to threaten danger at every turn; while outside, the flock of "barn-door" poultry ply their ceaseless search for food among the knee-deep straw, and the cattle, all their summer frolics forgotten, stand ruminating beside the half-empty hay-rack, or lean with inquiring faces over the gate that looks down into the village, or away towards the distant pastures."\*

The use of the flail is of great antiquity, although other modes of threshing corn were likewise practised among the ancients. The separation of the grain from the straw is more easily effected in hot and dry countries than in a climate similar to ours; in many parts of the East the treading out of corn by cattle was generally adopted, and proved quite effectual. "Thou shalt not muzzle the ox that treadeth out the corn," (Deut. xxv. 4,) is a well-known passage of Scripture illustrative of *this* custom. Another passage shows that the animals were trained to their task, and took delight in it: "And

Miller.

Ephraim is as an heifer that is taught, and loveth to tread out the corn," (Hosea x. 11.) Threshing by the feet of animals was practised in ancient Egypt, and also among the Greeks and Romans, though the latter people preferred horses, as better adapted to the work than oxen. The Hebrew nation were for many ages without horses, but, in the time of the prophet Isaiah, these animals were employed for the purpose: "Bread-corn is bruised; because he will not ever be threshing it, nor break it with the wheel of his cart, nor bruise it with his horsemen." (Isa. xxviii. 28.)

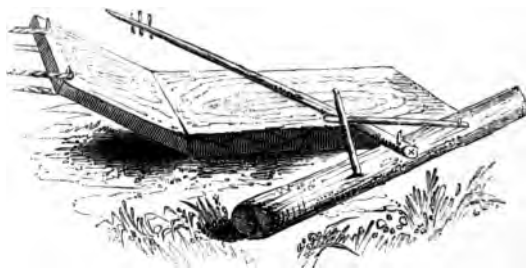


THRESHING BY HORSES.

This practice is still common in northern Africa, and is thus described by a traveller in that country:—"These nations continue to tread out their corn after the primitive custom of the East. Instead of beeves they frequently make use of mules and horses, by tying in like manner by the neck three or four of them together, and whipping them afterwards round about the *neddles*, as they call the threshing-floors, where the sheaves lie open and expanded in the same manner as they are placed and prepared by us for threshing. This, indeed, is a much quicker way than ours, though less cleanly ;

for as it is performed in the open air (Hosea xiii. 3.) upon any round, level plot of ground, daubed over with cow-dung, to prevent as much as possible the earth, sand, or gravel from rising; a great quantity of them all, notwithstanding this precaution, must be unavoidably taken up with the grain. At the same time the straw, which is their chief and only fodder, is hereby shattered to pieces, a circumstance alluded to in the second book of Kings, (chap. xiii. 7,) where the king of Syria is said to have made the Israelites 'like the dust by threshing.'

Besides this primitive method of separating the grain, there were others in which some attempt was made, at a very early period, to produce a machine or implement capable of threshing corn; allusion is made to such an implement in the following passage of Scripture: "Behold, I will make thee a new sharp threshing instrument having teeth: thou shalt thresh the mountains and beat



SYRIAN DRAG.

them small, and shalt make the hills as chaff," (Isa. xli. 15.) An implement answering to this character, and called a drag, was one in which a large and heavy block of wood was armed and roughened at the bottom with flints or pieces of iron, and was drawn by oxen, mules, or horses, over the sheaves of corn, as they were spread out on the floor. Sometimes this implement was

so formed as to admit of the driver sitting upon it. A very similar mode of threshing is still adopted in Syria and Asia Minor, and is described by an eye-witness\* as consisting of a thick plank of timber, flat on the ground, with another smaller one inclining upwards, to which the animal is attached. The flat portion of the implement is stuck full of flints, or hard cutting stones, arranged in the form of the rough tongue of the cow. This is dragged over the corn, which is spread out on the hard rocky ground. The roller is the trunk of a tree, often weighted by the driver riding on it. It is dragged over the ground, but does not revolve.

Another form of threshing is by the wain or sledge. This is still employed in Egypt and in western Asia. The sledge is fixed upon two or three wooden rollers armed with iron rings, having sharpened and toothed edges, so as to cut through the straw. The sledge is drawn by oxen, mules, or asses, and driven by a man seated in it. As it passes round in a circle over the corn, the grain, by repeated operations, is separated, while the straw is chopped by the jagged iron rings. The chopped straw was the ordinary food of cattle. There is a very interesting passage in the book of the prophet Isaiah, where four methods of threshing, namely, by the drag, by the wain, by the flail, and by the treading out of horses, are all mentioned within the space of two verses. The whole passage stands thus: "For the fitches [vetches] are not threshed with a threshing-instrument, neither is a cart-wheel turned about upon the cummin [dill]; but the fitches are beaten out with a staff, and the cummin with a rod. Bread-corn is bruised; because he will not ever be threshing it, nor break it with the wheel of his cart, nor bruise it with his horsemen," (Isa. xxviii. 27, 28.) These several arts of the husbandman are ascribed to the agency of the Almighty, who "doth instruct him to discretion, and doth teach him;" for in the following verse it is said, "This also

\* Fellowes.



cometh forth from the Lord of Hosts, which is wonderful in counsel, and excellent in working."

The threshing-floor of the ancients being in the open air, it was desirable to choose a high and open spot, that the grain might undergo a sort of winnowing by the mere action of the breeze. An ancient writer says, "When the corn is mixed with the straw, these ought to be separated in the wind. For this purpose the west wind is reckoned the best, which blows softly and equally through the summer months; however, to wait for this wind is the sign of a slothful husbandman, for while he is expecting it, he may be overtaken by a severe storm. Therefore in the area the corn that is threshed should be so heaped up, that it may be cleaned by any wind; but if for many days the weather should continue quite calm, the corn must be cleaned by fans, lest after the calm a severe tempest should destroy the labours of the whole year." The fan of the ancients does not appear to have been any winnowing apparatus for producing an artificial current of air; but merely a winnowing shovel, from which the grain, mixed with chaff, was thrown up across the wind, the lighter portions being by that means carried away, while the heavy grain fell to the ground. Many are the allusions throughout the Old Testament Scriptures to the chaff of the threshing-floor being carried away by the wind. This is the image frequently employed to describe the dispersion and final reward of the wicked: "They are as stubble before the wind, and as chaff that the storm carrieth away," (Job xxi. 18.) "The ungodly are not so, but are like the chaff which the wind driveth away," (Ps. i. 4.) "The multitude of the terrible ones shall be as chaff that passeth away," (Isa. xxix. 5.) "Therefore they shall be as the morning cloud, and as the early dew that passeth away, as the chaff that is driven with the whirlwind out of the floor, and as the smoke out of the chimney," (Hosea xiii. 3.) At the present day winnowing is carried on in *Syria* by the same simple process, as we find from the

description of a modern writer. "The chaff and bruised spikes are separated from the grain, by throwing the whole up into the air with wooden shovels when the wind blows moderately. The cleaner grain being deposited, together with chopped straw, in a heap by itself, the spikes imperfectly trodden are again submitted to the sledge. After some days, the grain being more perfectly winnowed and separated from the straw, is thrown again into a large heap called the *bydre*, where it remains to be divided between the landlord and the husbandman in the proportions established by agreement." The process of winnowing the wheat from the chaff, of gathering the wheat into the garner, and of burning up the chaff, &c., are well known images employed by the forerunner of the Messiah, to represent the final separation to be effected between the evil and the good, (Matt. iii. 12; Luke iii. 17.) The simple method of winnowing above described, often leaves impurities among wheat, such as sand, small seeds of weeds, &c. From these it appears to have been further cleansed, in Scripture times, by the use of the sieve. "I will sift the house of Israel among all nations, like as corn is sifted in a sieve, yet shall not the least grain fall upon the earth," (Amos ix. 9.)

Of all the early means of threshing corn, none was so effective or possessed so many advantages as that of threshing by the flail. Until about eighty years ago, no other implement was used in this country, and at the present time the flail is in general use over a great part of Europe. Its chief advantages are its simplicity, the regular employment it gives to labourers during a bad state of weather, and at a season when there is little out-door work to be done, and the convenience of having fresh straw for fodder every day:

"While wind and rain drive through the half-stripped trees  
Fanners and flails go merrily in the barn."

*The sound of the flail is by no means displeasing,*

but rather tends, by its constant and measured action throughout the long winter day, to inspire with cheerfulness all who come within sound of it. There is a satisfaction in knowing that the wet and dreary season has not shut up the whole village in idleness, but that some of its inhabitants are still labouring in their calling, and earning the fruit of their toil. No particular time can be named for the business of threshing, for it is common to all seasons, though more especially carried on during the winter months. An old writer, indeed, gives the following recommendation :—

“ Such wheat as ye keep for the baker to buy  
Unthreshed till March, in the sheaf let it lie;  
Lest foistiness take it, if sooner ye thresh it,  
Although by oft turning ye seem to refresh it.” \*

The first step towards threshing is, of course, the taking in of a rick. This is done by a few labourers and a superintendent; the latter mounts the rick, and begins to cut away with a stout clasp-knife, the tyings of the straw ropes at the eaves; this enables him to remove, by means of a long small pitch-fork, the whole covering of the wheat-rick, and throw it to the ground. On the side of the rick nearest the barn, the labourers now spread out a layer of this straw on the ground, and then extend the barn-sheet upon it, drawing the latter close to the rick. The barn-sheet is a large piece of thin canvass, perhaps about twelve feet square; upon this the sheaves are thrown down, and it is the office of women to place them evenly, side by side, along the two sides of the sheet, and to prevent their being blown aside or turned over; they are conveyed thence to the barn on barrows, and are piled up in rows to a considerable height with their butt ends outwards. This work is continued until the whole rick is taken in, after which the ground is cleared of loose corn by raking it into the sheet, and *then* doubling up the latter from the four corners, and

\* Tusser.

conveying it into the barn, where its contents are emptied on the floor. The cover of the rick is also cleared away, serving as litter for cattle. If possible a dry day must be selected for these operations, for when a rick is taken in during rain, or even during a drizzling mist, which may not do positive injury, yet the straw being damp, becomes mouldy, and smells disagreeably in the barn. A stack when once safely housed, may remain in the barn till fodder is wanted, or it may be threshed out the first wet day.



THRESHING.

The flail itself is a very simple implement; but in order to answer its full purpose, it should be made to suit the size and strength of the person using it. It requires a great expenditure of time and labour, and this

must be reckoned as its chief disadvantage; for it is often of great importance to the farmer to get his wheat threshed out quickly, either to meet a certain state of the market, or to suit his own particular convenience. In such a case he usually resorts to machinery; for there are no means of hurrying forward the operations of the flail, and to wait for its slow and tedious action might frustrate all his plans. But in ordinary circumstances the flail, for reasons already stated, is too advantageous to be laid aside.

The flail consists of two parts, called the hand-staff, or helve, and the supple, or beater. The helve is a light rod of ash, about five feet long, wielded by the



thresher in his operations, and slightly increasing in thickness at its lower end, where a hole is bored for the reception of the thongs of leather which bind the beater to it. The beater is also of ash, and is usually a cylindrical rod, thickened at the extreme end, the diameter being from an inch and a quarter to an inch and a half; it is furnished with two projecting ears, situated near the end at which it is to be attached to the helve. By a particular mode of adjustment, which must be seen to be understood, a strap of leather is laced with a thong of leather to this end of the beater, so as to form a loop *standing* about an inch beyond the end of the beater. Another thong of leather, of considerable strength, is

passed several times through this loop, and also through the hole in the end of the helve, and well secured. Thus a loose swing-joint is formed, allowing free action to the beater, as it is swung round the head of the thrasher previously to its descent upon the ears of corn. Sometimes a staple of iron is fixed to the end of the beater instead of the leather loop; but this requires to be made very smooth and round, otherwise it rapidly chafes the thong which binds it to the helve. When the beater is too heavy, the labourer is soon fatigued without any advantage being gained in the beating out of the grain; yet it is very common to see this part of the flail out of proportion to the rest, and considerably thickened at the lower end. This is supposed to give better effect to the blows; but as every part of the beater ought to strike the floor with equal force, and should perform its office on the corn beneath its whole length, it is therefore evident, that by thickening one extremity we prevent the other portion from reaching the ground at all, or, to say the least, we greatly weaken its effect. If there is any difference in the size of the beater, it should be in making the lower end thinner instead of thicker than the upper end.

Every one knows that in this variable climate the threshing of corn with the flail is carried on under cover. The English corn-barn is constructed with much care and expense, being built either with planks of oak fastened to a frame-work of wood, or with brick or stone, where the latter are plentiful. Openings are left in the sides, that the barn may be fully ventilated; without this the least dampness in the grain would induce mouldiness. The roof is either of tile or thatch. There are two large folding doors, one on each side of the barn, and exactly opposite each other; these are for the convenience of carrying a whole load of corn in sheaves into the barn. The doors are very wide, often equalling the width of the threshing-floor itself, *and thus giving light and space for the work.* The

material of the barn-floor is a matter of great importance, and differs according to the judgment of the owner. Compositions of an earthy kind are sometimes used, as are floors of brick or stone; nothing, however, can be superior, if equal, to a sound oaken floor, for this is close, firm, and strong, while, if properly laid, it is also the most secure from damp. Perhaps the best kind of earthen floor is that made in some parts of Gloucestershire, in the following manner: the surface of the intended threshing-floor is first dug out to the depth of six inches or thereabouts; the earth thus taken out is well cleared of stones and mixed with very stiff clay, and with the dung of cattle. The whole is then worked with water until it is formed into a stiff mortar: it is then spread as smoothly as possible, with a trowel, on the spot from which the earth was taken. In the course of drying, numerous cracks appear, but these must be filled up and got rid of by frequent and powerful beatings of the floor, or by the continued action of a heavy roller; when this is properly attended to, the floor becomes perfectly smooth and compact, and in dryness and solidity can scarcely be surpassed. It is in all respects superior to brick and stone, and yields only to oak plank in those qualities which are so much prized in a barn-floor. Yet unless made with care, earthen floors are by no means desirable; the small cracks and crevices which sometimes occur in them, harbour insects to a very injurious extent; and if the floor once becomes damp, a serious mischief is done to the wheat. Asphalte, a material now coming much into use for pavements, will probably be employed also for barn-floors. In most respects it seems admirably adapted to the purpose, but there would be one deficiency still; it would not have that pliability or elasticity which makes the floor of oak so pleasant to work upon. A thoroughly well-made floor of oak is, after all, the perfection of a barn-floor. It is made of good-seasoned planks, accurately measured, the edges shot true,

and well fitted and jointed; these are nailed closely down to wooden joists or sleepers, firmly placed and secured upon the ground. This is the usual method of forming oaken barn-floors, but in the midland counties another plan is followed: instead of being nailed to wooden sleepers, the planks are laid down over a level flooring of brick, and are merely held together by being "dowled," that is, ploughed and tongued, while their ends are let in to sills or walls placed, as usual, on each side of the floor. The brick-work beneath the floor, if truly level, hinders vermin from harbouring there, and at the same time prevents the ascent of moisture from the earth, thereby causing the floor to last longer. But to set against this, the "spring" of the floor is gone, and the grain is consequently threshed with less ease and dispatch. The only drawback to the comfort and advantage of an oaken floor for barns is, that after all precautions, it does not last very many years in that fine level condition in which it is first laid down, and consequently, it brings much expense on those who like to see their barns in good condition. But when it is become too uneven for threshing, the planks may be planed down so as to make excellent floorings for rooms.

In threshing, as well as in all other departments of labour, the master's eye is often needed; there is a temptation to slight the work, as well as to pilfer the grain: but a good servant will resist both. Tusser notices this in his usual quaint style:

"When rain is a let to thy doings abroad,  
Set threshers a-threshing to lay on good load;  
'Thresh clean,' ye must bid them, though lesser they earn,  
And, looking to thrive, have an eye to thy barn.

"Some pilfering thresher will walk with a staff,  
Will carry home corn as it is in the chaff;  
And some in his bottle of leather so great,  
Will carry home daily both barley and wheat."

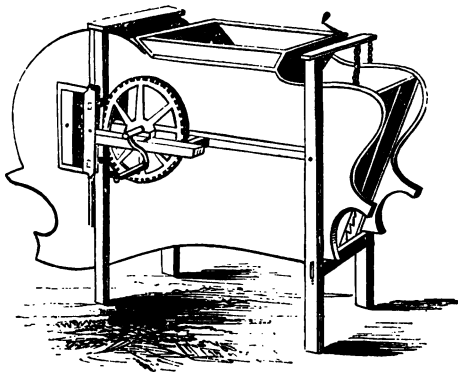
These lines relate to by-gone customs; but it is *unfortunately necessary* at all times to watch against



fraud. A precaution recommended by the same writer is, to remove the temptation as soon as possible—

“Cause weekly thy thresher to make up his floor,  
Though slothful and pilferer thereof do lour;  
Take tub for a season, and sack for a shift,  
Yet garner for grain is the better for thrift.”

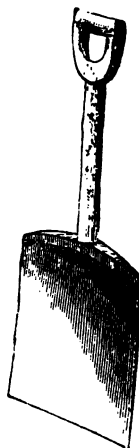
The corn has now to be winnowed. This is done by the winnowing machine, a contrivance for separating the chaff from the grain by an artificial current of air. One James Meikle is said to have brought the first idea of this invention from Holland in 1710, though the machine was not much known for many years after. Like most other valuable inventions, this has gradually been improved and added to, until at the present time it performs its work very completely. On the outside, the modern winnowing machine appears as represented



WINNOWING-MACHINE.

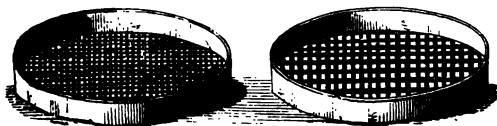
in the wood-cut: on the inside the machinery is simple and easily understood. Four or more boards are fixed at equal distances from each other on an axle, extending through the machine and whirled rapidly round by a

l acting upon a pinion. By this means a current r is produced within the machine. The threshed is put into a sort of box or hopper at the top, whence it falls gradually through the current r produced by the rotating boards, and the chaff is 1 out at the tail of the machine. The grain is er scattered and exposed to the air by passing gh one or more sieves of wire, which are in con- lateral motion. The chaff being thus completely ated, the heavy grain falls down, and is collected th. The winnowing-machine is generally set with il at the barn-door, that the chaff may be blown urds from the barn. Women are often employed feed" the hopper with corn, and to collect the owed grain, while a man works the wheel which he fanners in motion. The riddling of the corn on at the same time; for that 1 is collected from the machine ried to two women, who stand with a riddle in her hand, at the n the barn where the new heap of is to be made. The refuse corn, 3, dirt, &c. which will not pass iddle, are thrown into a bushel l to receive them. When corn is d clean, there should be nothing out good grains. If any earth or seeds be still found mixed with orn it must be riddled through e. The clean corn is shovelled to a compact heap by means of rn-scoop, while the grain scat- to a distance is swept up with m. The chaff is, in most cases, d upon as useless and carried to nghill; and the refuse corn is ined, and sometimes passed a second time through nners, though oftener put away as food for poultry.



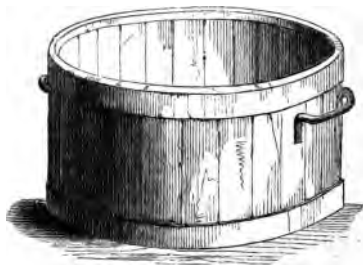
CORN-SCOOP.

There is much less storing of wheat in granaries at the present time than in years past ; but in some parts of the country, where it is still stored to a considerable extent, a process of the following kind is adopted :— The heap of cleansed corn is removed to the granary, spread over the floor about half a foot thick, and turned from time to time about twice a week. This is continued for the first month, at the end of which time the wheat is laid a foot thick, and is turned once a week, or twice if the weather be damp, being also screened at intervals. After six months have elapsed, it is raised to two feet in thickness in the heaps, and turned about



CORN-RIDDLES.

once a fortnight. At the end of twelve months it is laid two or three feet deep, and is turned once in three weeks or a month, and screened in proportion. When it has



IMPERIAL BUSHEL.

lain two years or more, it is turned once in two months, and screened once a quarter. However long it remains in the granary, the oftener the screening and turning

are repeated, the better. The sifting of corn is effected by means of sieves, or riddles of different degrees of fineness, and it is measured out by the bushel. The imperial bushel is eight inches deep, and rather more than eighteen inches and a half in interior diameter, and contains 2,815 cubic inches; but besides this legal bushel, there are several local bushels, of different dimensions, in different places. Before the year 1835, the wheat was heaped up on the bushel, in the form of a cone, to at least three-fourths of its depth; but at that period the



THE STRIKE.

heaped bushel was abolished. The contents are now swept off on a level with the rim of the bushel; and for that purpose, a flat piece of wood, called a strike, is used. Sacks of wheat are conveniently removed from place to place, by means of the load-barrow or sack-barrow. Granaries should always be well ventilated, and should also be built in situations where they will be exposed to drying winds. Considerable spaces should also be left between the several heaps of corn on the floor, that air may circulate, and that there may be room for turning and tossing the grain when requisite. In Kent, two square holes are made at each end of the floor, and a round one in the middle, by means of which the corn is



SACK-BARROW

thrown out of the upper into the lower rooms, and back again, that it may be the better turned and aired. The screens are made with two partitions, to separate the dust from the corn. By these and similar precautions, wheat has been kept in our granaries thirty years; and it is observed, that the longer it is kept, the more flour it yields in proportion to the corn, and the purer and whiter the bread is. At Zurich, in Switzerland, corn has been kept eighty years by such means as the above.

Public granaries are generally built in situations where ships may come up to their very walls to be loaded with grain; yet if well built, and if good methods are employed for preserving the corn, it neither becomes damp, nor receives any injury from the near vicinity of the water. These granaries are mostly seven, eight, and nine stories high; and have a funnel in the midst of each floor, to let down the corn from one story to another. In Russia, grain is preserved in subterranean granaries of the figure of a sugar loaf, wide below and narrow above; the sides being well plastered, and the top covered with stones. The summer in that country is too short to allow of the corn being effectually dried in the field; therefore it is afterwards subjected to the heat of kilns, that it may be in a fit condition to store away for future use. This practice is not confined to Russia, but is prevalent throughout the north of Europe; and it has been suggested that the example might be followed in this country, in wet and "catching" seasons, with beneficial results. Kiln-drying is not unknown in England, but this applies to the grain when threshed out from the straw, and not to wheat in the sheaf. When corn is harvested in a very damp state, the grain is sometimes laid to the depth of three or four inches upon a raised and tiled floor, heated by coke, wood embers, or peat. It is frequently turned for twenty-four hours, or thereabouts, when it is generally dry enough to be stored. *Great care is necessary to prevent scorching.*

*The continental practice is as follows:—A simple*

•

and cheap kiln is constructed, with walls eight feet high, enclosing a space of about fifteen feet square. At this height, there are two strong cross beams, on which are laid smaller timbers or ribs to receive the corn. The walls then rise above the ribs five or six feet more, the kiln being closed by a simple ceiling of cross-joists, covered with turf. Any cheap and ordinary roof answers to cover the whole. The fire-place is constructed so as to throw back the ascending sparks, and a small porch directly opposite to the fire-place, prevents violent blasts of wind, and covers the fuel and the attendant from rain. The drying-floor contains about three hundred sheaves of corn, which are closely set up—the band end of the sheaves downwards, and the grain upwards—usually towards evening, and when the wood which is employed to heat the kiln has burned to charcoal. By the next morning the wheat and straw are generally found in a dry state, and may then be stacked in perfect safety; for all danger of their becoming either heated or mouldy is now removed, and the sheaves are in the best possible condition for the flail. The process of kiln-drying by no means prevents the germination of the corn when used for seed, while it not only preserves both grain and straw, but increases their wholesome qualities. Straw is the chief provender of cattle in Russia, and to provide it in a fresh state, the peasantry thresh out their oats and barley by degrees, just as we do in this country. By the process of kiln-drying, Russia is able to export large quantities of rye and wheat with less risk of damage to the grain, than is incurred by other nations similarly circumstanced, where the practice is not known or adopted. Through the north of Russia, Livonia, Courland, and Lithuania, kiln-drying is so general as to be considered the closing operation of the harvest. By it all kinds of corn, peas, beans, and buck-wheat are preserved, and are ready for immediate threshing, or for being stowed away in barns, without any danger of either *straw or corn* receiving injury. The expense of kilns,

for drying damp or damaged sheaves in this country would be very trifling. A frame-work of rough material might be filled in with clay or turf, while any ordinary roof would serve to cover in the building; and where peat is plentiful, the fuel would be of small cost. This kind of kiln might likewise be employed in drying other kinds of seeds, and also various provisions.

The importance of securing the straw in good condition will not be questioned by those who understand the ordinary uses of wheat straw, and also the many important purposes it answers in the arts. All that kind of work called Dunstable work, by which a great number of persons find employment throughout the kingdom, is due to it; and it also enters into the manufacture of baskets, mattresses, hats, boxes, bee-hives, &c. Wheat-straw is sometimes of great length, and forms a beautiful thatch. The best specimens of thatching are seen in the county of Devon.

Every part of the wheat plant serves some useful purpose. The very chaff, or outer husk of the corn separated by threshing and winnowing, is not to be despised. Tusser says of it:—

“ Save chaff of the barley, of wheat, and of rye,  
From feathers and foistiness, where it doth lie;  
Which mixed with corn,—being sifted of dust,—  
Go give to thy cattle, when serve them ye must.”

What is more generally understood by “chaff” in the present day, is hay, straw, &c., cut small for the purpose of being given to horses and other cattle. This sort of provender for live stock was employed at a very early period, but the method of preparing it by the knife was a later improvement, and was conducted for a long time in a very rude manner. The hay, &c., was pressed down in a trough, and then brought in small portions by hand to the front-edge, where it was cut through by a long knife attached to a lever. It was in the year 1797, that the first effective chaff-engine appeared, being the

invention of Robert Salmon, of Woburn, who contributed much to the agricultural improvements of his day. From that time, chaff-cutting machines, upon the same plan, but differently modified, were gradually adopted throughout the country, until at the present time there is scarcely a large-farming establishment unprovided with

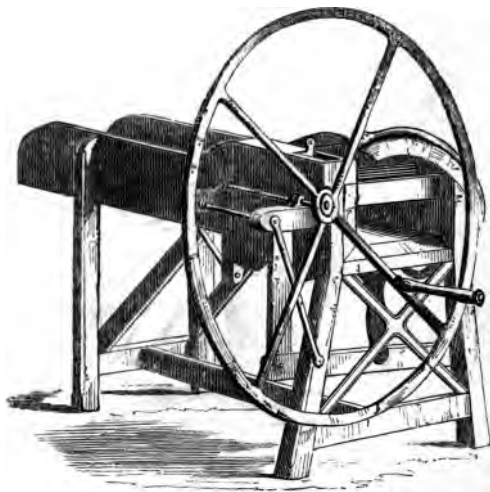


CHAFF-CUTTING.

a chaff-cutter. This implement may either be constructed with a good deal of expensive machinery, or it may be made at very small cost. One of the best forms of modern chaff-cutter, is that known as "Lester's Improved," in which the hay or straw is cut by means of a single knife, placed on the fly-wheel, in length varying from a quarter to three-quarters of an inch. The fly-



wheel turns on a cranked spindle, which moves a ratchet wheel, fixed to one of the feeding rollers, by means of a small hook or catch, which is capable of being so adjusted as to lift one, two, three, or four teeth at each revolution; and by this is regulated the length of the straw projected in front of the face plate, and which is severed by the knife. On the roller was fixed a revolving cloth which passed over another roller at the hinder



LESTER'S IMPROVED CHAFF-CUTTER.

end of the box. A heavy block was used to compress the straw. In modern engines, the rolling cloth is dispensed with, and its place supplied by an upper feeding roller, moved by a pair of cog wheels, one of which is attached to the lower feeding roller before described; instead of the heavy block, a pressing piece, which receives its motion from the cranked spindle, alternately presses down the straw previous to the cut, and rises

afterwards to allow the straw free passage. The machine is made of different sizes, and the larger are frequently worked by horse-power.

The numerous inventions of the present age have greatly shortened some of the processes of agriculture, but there are others which appear incapable of abridgment, and which must always demand a great amount of manual labour. It is very unlikely that the work of reaping will ever be materially shortened; but the processes of threshing out the grain, and of converting the straw into provender, have been greatly quickened by the aid of machinery. The introduction of new methods of rural industry are often looked upon by the labourer with a jealous eye. Nor is this to be wondered at. He has been accustomed to a particular method of doing his work, and it has become easier to him, from habit, than a new, though an improved method, would be. A good servant, however, is anxious to promote his master's interest, and has sufficient sense to see that by so doing he will also serve his own. He is, therefore, ready to lay aside some of his prejudices, and to enter into any new mode of working that may be judged necessary by his employer. Labourers are beginning to be in some degree sensible of the advantages of modern inventions. The threshing-machine, for instance, which was once the object of their prejudice, is now justly felt to be a very *useful and important* help at particular seasons; while

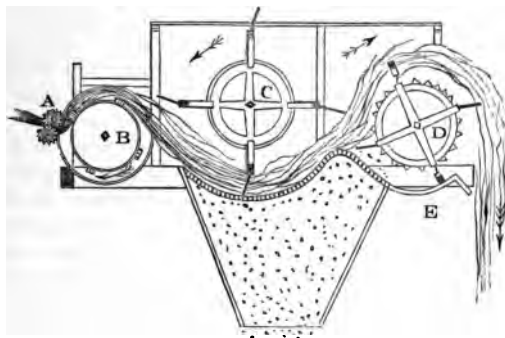


THRESHING-MACHINE.

it does not supersede the general labours of the flail. It is an undoubted fact that the latter implement, in the hands of good threshers, is perfect in its way, and may be made thoroughly to clear the grain, without damage to the corn or to the straw; but it is, in the first place, very difficult to get the work done in the best manner, and even when so done, it is so slow a process as to be utterly incompetent to meet at all times the farmer's wants and convenience. On account of these difficulties, there were frequent attempts made to shorten the labour by the construction of some machine that should answer the purpose of many flails. In the year 1732, Michael Menzies, of East Lothian, invented and patented a machine for threshing grain. The Society of Improvers in Scotland appointed a Committee to inspect the operations of this machine, and report upon its merits. This Committee gave it as their opinion "that the machine would be of great use to farmers, both in threshing the grain clean from the straw, and in saving a great deal of labour; for one man would be sufficient to manage a machine which would do the work of six." This seems to be the only record of this early machine, and we are not aware of the principles on which it was constructed. Other machines failed in their object because they were found either to break the ears of corn without clearing them, or else to grind the whole to powder. It was not till the close of the century that a considerable advance was made. In 1785, Andrew Meikle, also of East Lothian, first invented a machine in which the corn was introduced between two rollers, and threshed out by four beaters fixed upon a revolving drum, each striking, as it revolved, the corn held between the rollers. This was found to answer well; so that, although changes and improvements have been made in certain respects, yet in its essential principles, the invention of Meikle has been followed and adopted up to the present day. It is pleasing to learn that the inventor of this important machine was rendered com-

portable in his old age, and enabled to provide for his family, by the voluntary donations of his grateful countrymen. Numerous patents have since been taken out, for inventions and improvements, by which this machine has been brought to great perfection.

The following wood-cut will make the principle of the threshing-machine quite clear. At A are fluted iron rollers between which the unthreshed corn passes, at rather a slow rate; B is the cylinder or drum, containing four projections or beaters. These are bars of wood



covered with iron, and revolve rapidly. Grain, chaff, and stems, all pass over this cylinder, and are thrown forward into the second compartment, where they are acted upon and shaken by four rakes, placed on the hollow cylinder C, and moving rapidly in the direction of the arrow. Here the grain and chaff fall down through the wire meshes into a winnowing machine, and the straw is carried forward to another cylinder D, where it is again shaken by rakes, and then thrown out at the end of the machine. Sometimes this last cylinder has brushes fixed to it, which sweep back any of the corn or chaff which may have fallen into the cavity at E.

*The threshing-machines commonly used in the eastern*

counties, are, for the most part, such as belong to individuals who gain their livelihood by taking them from one farm to another, and working them at so much per quarter. The farmer finds horses and men, but the owner superintends and feeds the machine. In these instruments the beaters—four, five, or six in number—are placed round the drum, and strike upon the straw, which is passed along a feeding-board. The concave describes the third part of a circle, and is formed of iron ribs and open wire-work, so placed that its inner surface may be brought into near contact with the edges of the revolving beaters, and capable of being adjusted by screws, to increase or diminish the distance. The usual plan is to place it with about three-quarters of an inch space at the feeding part, and gradually to increase the distance to an inch and a quarter, or two inches, at the lower end, where the straw is delivered upon a fixed harp or riddle, through which such part of the grain as is not driven through the wired part of the concave falls, while the straw is removed by forks. The threshing part, commonly called the barn-work, occupies a space of six feet by four-and-a-half feet, and, together with the apparatus by which motion is communicated (which is made either for two, three, or four horse-power), may at pleasure be elevated upon a pair of wheels and axle, and thus removed by two horses.

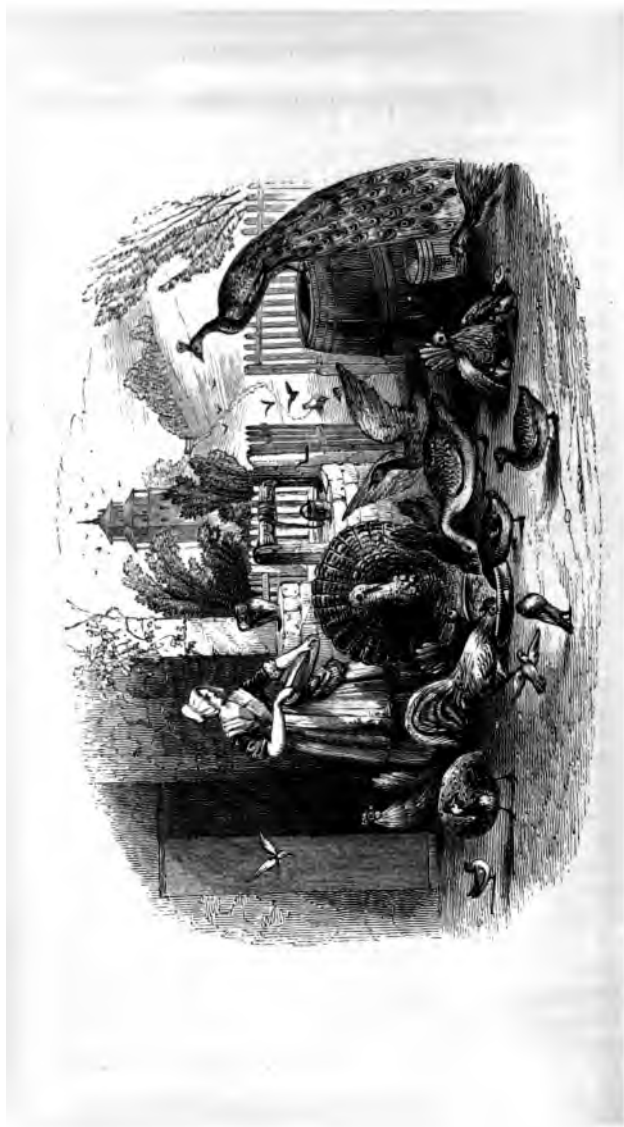
There are two circumstances which greatly affect the regular action of the threshing-machine, and the cleanliness of the work performed by it. These have been well described thus:—"The first is the mode of *driving the horses*, in which a considerable difference is felt when one man keeps the horses at a regular pace, whilst another drives them by fits and starts. The regular motion is effected by the man walking round the course in the *contrary direction to the horses*, in which he meets every horse twice in the course of a revolution, and which keeps the whole upon their mettle, every horse expecting to be spoken to when he meets the driver. The irregular

motion is produced by the man walking in the same direction with the horses, when the horse next him makes the greatest exertion until he outstrips the man, and then slackens his pace; then the horse that follows him, coming up to the man, exerts himself until he also passes him; and so on in succession with every horse. The man, in such a case, always walks slower than the horses; and when he gives a crack of the whip, all the horses give a start, and of course strain the machine; but immediately after, they relapse into their usual dogged walk. In such a style of driving, a willing horse is apt to get more to do, and a lazy one less, than it should, as horse-wheels are usually constructed.”\*

Notwithstanding the advantages of machinery, it must be confessed that the straw often gets much broken and injured: this, however, would not be so frequently the case, were the machines formed with accuracy, and were the above rules, as to steadiness of driving, fully understood and followed.

\* Stephens.







~~~~~

UNDER the term Domestic Poultry, we understand Common Fowls, Turkeys, Ducks, Geese, and Pigeons. The different varieties of poultry are fitted to bear extremes of heat and cold, and thus they can exist in almost every climate habitable by man. This advantage has not been neglected by emigrants, who gladly cherish these useful and productive birds in different parts of the world.

The rearing of poultry is a thing less attended to in England than formerly, and for a very plain reason. At the time when small farms were common, the wives and daughters of the farmers themselves took their eggs, butter, and chickens to market, and sold them to the best *advantage*. The produce of the poultry-yard was gene-

rally their own perquisite, and they had every inducement to attend to the welfare of this profitable stock, which yielded them a good return in pocket money. But in our own day, small farmers, as a class, have almost disappeared, and the land is principally in the hands of men of capital, who seldom rear more poultry than will supply their own tables. Hence our markets are not so regularly supplied as they ought to be, and a large proportion of the poultry sold in London is obtained from France. At the present time, indeed, there are to be found, even among our nobility, many poultry-fanciers, who study and cultivate the finest varieties as a matter of pleasure. And it is to be hoped that this example will spread more widely among the middle classes.

It would be matter of regret if so pleasant and profitable a task as the rearing of poultry should be suffered to fall into neglect. At a very trifling cost, many a cottager might be provided with the means of keeping ducks and fowls, to be cared for by his wife and children. In the case of farm-labourers the practice is often objected to, as tempting men to pilfer from their employers the necessary food for the fowls; it could, however, be granted as a privilege to persons of tried honesty, as a means of increasing their little store. There are also many other families who might be profited by the keeping of poultry, if good methods of management were followed, and understood. Some of these will be explained as we proceed.

Every one who knows anything about poultry, is aware that they want shelter from inclement weather. This shelter is sometimes found in the cottage kitchen, or in the ordinary outhouses of a farm; but it is most convenient to have a place purposely for poultry, and devoted to no other use. Even the humblest cottager may contrive some little shed for his fowls, if he has common dexterity to use the materials which are plentiful in country places; and as warmth is very necessary

to the health of poultry, he will do well to make his hen-house at the back of the kitchen fire-place, if his cottage is built in a manner that will allow of that arrangement. A still better plan might be followed, if it were taken into consideration in the building of cottages, that the space next the roof, often left empty and useless, would make a good hen-house, especially that part of it near the chimney, where sufficient warmth would be secured even in the coldest weather. This part of the roof might be partitioned off, and an opening left for the entrance of the fowls by means of a hen-ladder. Of course there must also be a hatchway, to enable the owner to go in and out, for the purpose of cleaning and looking after the fowls. In this situation fowls would be safe from their natural enemies the fox, the weasel, and the pole-cat, and would only be in danger from rats and mice, which even there might find them out and destroy their eggs. A hen-ladder is necessary to all poultry-houses, as the birds are very apt to injure themselves in attempting to fly down from the roof.

In rearing poultry on a large scale, a distinct yard is required for the purpose. The place chosen should always be a dry and sheltered spot, with a warm aspect. A good fence and a supply of running water are also needful, and a neighbouring field for them to range in is a desirable addition. The house should be well roofed, dry, and facing the east or south, separate apartments being provided for each kind of poultry. Two small lattice windows at opposite ends of the building will allow of free ventilation when required, and the perches should be so arranged that one row of roosting fowls be not exactly over another. The floor should be of strong flag-stones, and the roof of slate, well filled in underneath, and lathed and plastered on the inside. Thus there would be no place of harbour for vermin either in the roof or under the floor. There should be a separate place for a hatching-house, with many divisions, *containing nests for the sitting hens.* This place should be

either heated by means of a flue, or built near some warm chimney-back. In some cases, where poultry are kept chiefly as a matter of fancy, much expense and ornament have been bestowed on their dwellings.

The Royal Poultry House in the Home Farm at Windsor is highly ornamental, at the same time that it is perfectly adapted to the wants of the birds. It was built under the immediate superintendence of the Queen and Prince Albert, and consists of a central pavilion, flanked by roosting places, and breeding and laying nests. From this pavilion all the poultry can be conveniently inspected, and at the top of it is an elegant pigeon-house lined with looking-glass, in which pigeons delight to gaze while they prune and dress their feathers. A gentle slope in front of the pavilion is divided, by slight wire fences, into wards or places of daily exercise for the fowls, where they have grass plots and gravel paths, the latter leading to the entrance of their respective houses.

The apartments in this poultry-house are light and airy; the fittings, temperature, and general economy of the house being carefully regulated with reference to the natural habits of the birds. The nests are made to resemble as closely as possible those which the birds would form in a natural state.

Another and a most magnificent poultry-house is that of Lord Penrhyn, at Winnington, in Cheshire, which, as far as we know, is still appropriated to its original use. This consists of a handsome regular front, extending about one hundred and forty feet, at each extremity of which is a pavilion, having a large arched window. The pavilions are united to the centre of the design by a colonnade of small cast-iron pillars, painted white, which support a cornice, and a slate roof, covering a paved walk and a variety of different conveniences for the poultry, for keeping eggs, corn, &c. The doors into *these* are all of lattice-work, also painted white, and the *framing green*. In the middle of the front are four

handsome stone columns, and four pilasters, supporting likewise a cornice and a slate roof, under which, and between the columns, is a beautiful mosaic iron gate. On one side of this gate is a little parlour nicely furnished, and at the other end of the colonnade a perfectly neat and well-ordered kitchen. This front is the diameter or chord of a large semicircular court behind, round which there is also a colonnade, and a great variety of conveniences for the poultry. This court well paved, and has a pump and a circular pond in the centre. The whole fronts towards a rich poultry paddock, where the fowls range at liberty between meals. At one o'clock a bell is rung, and the central iron-gate is thrown open. The poultry, at this well-known signal, fly and run from all quarters, to share in the repast. About six hundred fowls of different kinds rush through the gate, eager to get the first share in the scramble.

This poultry-place is built of brick, excepting the pillars and cornices, and the lintels and jambs of the doors and windows; but the bricks are not seen, being all covered with a fine kind of slate, closely jointed and fastened with screw-nails on small spars fixed to the brick; they are afterwards painted, and fine white sand thrown on while the paint is wet, which gives the whole the appearance of free-stone.

But it is not often that poultry meet with such splendid accommodation as this. In fact, their ordinary wants are scarcely attended to, by many who profess to keep them. It is especially painful to witness the attempt to keep them in the close precincts of a city-dwelling. Too often, in the dark and crowded streets of London, a few miserable fowls may be seen on the pavement or in the area below, their claws worn away with scratching the hard stones, so that not being able properly to comb themselves, they are overrun with vermin, and their feathers ruffled and dirty from neglect. This is cruel treatment for these fine birds, whose *great delight it is to range in grassy meadows, searching*

for worms, or other insect diet, and exhibiting their rich and glossy plumage to the best advantage in the sunbeams.



THE COCK.

The Common Cock is the type of our domestic fowls, and is a remarkably handsome bird. His courage, beauty, and cheerfulness have made him celebrated from ancient times. The following quotation from Pliny will give some idea of the high estimation in which this bird was held by the ancients, and of the exaggerated and superstitious notions which they entertained of him:—"Next to the peacock, the birds most sensible to glory are those active sentinels which nature has produced to rouse us from our matin slumbers, and send us to our daily occupations. They are acquainted with the stars, and every three hours they point out to us by their crowing the different periods of the day. They go to rest with the setting sun, and from the fourth military watch, they loudly recall us to our toils. They do not suffer the

lay-beams to surprise us without timely warning; their crowing announces the hour of the morning, and the crowing itself is announced by the clapping of their wings. Each farm-yard has its peculiar king, and amongst these monarchs, as amongst the princes of our race, empire is the meed of victory. They seem to understand the design of those weapons with which their feet are furnished. Two rivals sometimes perish together in the combat. If one be conqueror, he immediately chaunts forth his own supremacy, while the other retreats and disappears, ashamed of his defeat. The gait of the cock is proud and commanding; he walks with head erect and elevated crest. He alone, of all birds, looks habitually upwards to the sky, raising at the same time, his curved and scythe-formed tail, and inspiring terror in the lion himself, that most courageous of animals. Some of these birds seem born for nothing but warfare, so as to render the countries that produced them famous, such as Rhodes and Tanagra. The second rank is assigned to those from Melos and Chalcis,—birds truly worthy of the homage they receive from the Roman people. Their repasts are solemn presages; they regulate daily the conduct of our magistrates, and open or close to them their own houses. They prescribe repose or movement to the Roman forces; they command or prohibit battles; they have announced all the victories gained throughout the universe; in a word, they lord it over the masters of the world. Their prolonged notes in the evening, and at extraordinary hours, constitute presages. By crowing all night long, they announced to the Boeotians a celebrated victory over the Lacedemonians; thus did the diviners interpret it, because this bird never crows when he is conquered."

Domestic fowls are supposed to be of Persian origin, but are now inhabitants of most parts of the world. There are many varieties, of which the principal are the *Dorking* (so called from a town in Surrey), a large

white or mottled fowl, distinguished by having five claws, short-legged, and an excellent layer; *the Poland fowl*, black-feathered, with white tufts on the heads of both cock and hen, a most useful variety on account of the number of eggs they lay, but they are bad sitters; *the Dunghill fowl*, a common and useful breed, the best of which are of middle size, and dark colour, with white and clean legs; *the Game fowl*, a variety with beautiful plumage, tender and delicate flesh, and slender, well-formed limbs; *the Bantam*, a well-known small breed, originally from India, and delicate in its flesh; and *the Chittagong or Malay*, a large Indian variety, laying large eggs, but having coarse yellow flesh. These and many other less important varieties are in request among poultry fanciers.

The young birds, if females, are called chickens for the first four months; afterwards pullets, until they begin to lay, when they become hens. The male birds are chickens until three months old, after which they are called cock-birds till the age of twelve months, when they are considered as full-grown cocks. The plumage of very young birds is not always a guide to the colour of the same birds when full-grown. There is much variety and considerable beauty in the colours and markings of our domestic fowls, especially when the birds are well kept, and in fine health. There is a freshness and gloss about the plumage of such birds, quite different from the aspect of fowls that are neglected as to cleanliness and diet. The plumage of the cock is generally very handsome beautifully pencilled, and reflecting in the sun's rays a brightness of colouring almost equalling the splendour of tropical birds. Sometimes instances occur of remarkable changes of colouring after moulting. Réaumur, the naturalist, describes a cock whose plumage was for the first year ruddy brown, mixed with white, as is common in dunghill cocks; in the second year he was of a reddish brown all over, without any white; in the third year he became uni-

formly black; in the fourth uniformly white; and in the fifth he had white feathers mixed with a good deal of ruddy brown, bordering upon chestnut, his back, neck, wings, and belly being ruddy, and even where there were white feathers, they were mingled with ruddy ones. His owner being absent for two months in summer, found the cock, on his return, again totally changed, his plumage having become all over of the purest white.

The general plumage of the male bird is richer than that of the female, and the tail is much larger and more majestic. The crown of the head is also adorned with a fleshy crest, called the *comb*, and the lower mandible or bill with *wattles*, as those fleshy appendages are termed. When the bird is in good health, the comb and wattles are bright crimson; when the bird is moulting or otherwise ailing, or in old age, they are pale and dingy; in severely cold weather they become purple or bluish. In the female, the crest and wattles are very little developed, except in old age, when the hens sometimes acquire a sort of neuter appearance, and have even been known to crow like a cock.

The cock is a stately and majestic bird, his whole deportment being indicative of a courageous and self-dependent spirit. He is lordly in his demeanour to the other birds of the poultry-yard, and requires implicit obedience from his numerous family. But he is kind and attentive to their wants, seeking out food for them, and when he has found it, calling them all together, and sharing it among the hens and chickens. He also fearlessly defends them from their enemies, attacking with great boldness all intruding animals. His jealousy of rivals is intense, and he will combat to the death with a bird of his own sex and species, unless that bird be so young as not to incur his hostility. In some cases cocks are naturally of so quarrelsome a disposition, that they beat and annoy the hens, and are continually breaking in upon the establishments of *their neighbours*. In this case they are tamed by put-

ting a piece of leather over the foot close under the spur. This completely subdues their spirit, and quenches their disposition to fight. The quarrelsome nature of the cock has been made use of to gratify the depraved taste of man in those shameful exhibitions called "cock-fights," in which the most spirited birds of the race of "game-fowls" are set against each other in regular battles, generally ending in the death of one, if not both birds. This barbarous sport, so disgraceful to a nation professing Christianity, is happily almost at an end.

The hen is less quarrelsome than her mate, but has plenty of courage in defending her young brood in the time of danger. Hens, when properly managed, produce a great number of eggs in the course of the year. They should have abundance of wholesome food, but not be fattened beyond a certain extent, for the eggs of over-fat hens are few and imperfect. A warm and sheltered situation is necessary for hens, and it is also needful that they have access to cold water and to gravel, and be allowed to range freely, without being driven or worried. The best *sitting* hens are those which are of a quiet, social disposition, not easily frightened, nor apt to wander far. Large, full-feathered hens are also preferred, as being the best able to cover their eggs. Such as have proved themselves to be good sitters are, of course, the best hens to be employed; but one or two young hens may be tried each year. Young hens will show a disposition to sit the following spring to that in which they were hatched; but only one or two should be allowed to do so. If the hens are few, they are often left to seek out a place for their nest in some outhouse, loft, or other quiet place, and there they are as little disturbed as possible. But where poultry are kept on a large scale, regular hatching-houses are provided, and each hen has a separate place partitioned off, where she may hatch her brood in safety. The desire to sit is shown by the hen making a clucking noise, similar to the call used in gathering together her

chickens. Her feathers are also in disorder, her wings hang down, and her body becomes greatly heated. She seems possessed with a kind of feverish anxiety, searches everywhere for eggs, and if she finds any, whether of her own laying or others, she immediately settles down upon them. Eleven or thirteen fresh eggs are generally placed under one hen; the former number being the more likely to succeed. One or two old eggs are put first, to coax the hen to the spot, and food and water are placed close by the nest. When she has taken to the nest, and warmed it, the old eggs are taken away, and the eleven fresh ones substituted. These she will arrange in her own way, with bill and body, until she can cover them all completely. The evening twilight is the best time for this, the hen being then naturally disposed to remain quiet, whereas by setting her in the morning, there is a risk of her being disturbed or alarmed, and forsaking the nest. A hatching-house should be supplied with proper nests for the sitting-hens. These may be either boxes or baskets; but the corners and openings as well as the bottom, must be well stuffed with straw, that neither eggs nor chickens may fall through and be lost. Short, soft straw is the best lining for the nests. Hay is too heating in its nature, and has been known, by fermenting, to spoil the whole batch of eggs. Notice should be taken every morning, whether any of the eggs are broken, and if so, the straw as well as the broken eggs must be taken away, and fresh clean straw put in its place. Fresh food and water must be given to sitting-hens every day, and the place kept clean and dry. In about three weeks' time the chickens will begin to appear. It is frequently recommended to watch the opening of the eggs, and to chip away the shell, if any difficulty occurs; but this requires the greatest caution, and, generally speaking, it is the safer plan to leave the whole operation to nature. In very many cases all the eggs will be hatched; and where one or two fail, it is

not a matter of great importance. Attempts to chip the shell very frequently cause the death of the chick.

An attempt to raise an unusual number of chickens at one brood is generally unsuccessful. The mother is unable to take care of more than a certain number, and the rest soon fall a prey to their enemies. The hen herself would seem to be aware of the impossibility of safely rearing a larger brood than her wings will conveniently cover. A remarkable instance of this has been lately communicated to the writer. A hen having a very large brood, endeavoured for a long time to accommodate all the chickens beneath her wings; but notwithstanding her efforts she found that there was one poor little chick for which she could not possibly find room. With a stern severity, little to be expected in so tender a mother, she took aim at the unfortunate chick, and with one blow of her sharp beak on its skull she immediately put an end to its existence. She seems to have known that the presence of one chick more than she could shelter would be injurious to the whole brood. But to return to our account of the raising of chickens.

When the chickens are fairly out, they will require great attention for a few days. Their food must be taken to them fresh every three hours during daylight; and water, in a very shallow dish, must be constantly renewed. Bread-crumbs, finely crumbled boiled potato, groats, rice, and pearl-barley, may be given in turn in small quantities, and fresh every time. If left to range where she pleases, the hen will lead the chickens too far, and bring them into danger: she must, therefore, be confined within a coop, or in some convenient out-house, until the chickens are strong enough to accompany her in her wanderings. It is absolutely necessary to the health of chickens, that they be kept quite clean and dry. Precautions must also be taken to save them from the clutches of their enemies, among which the rat and the weasel are not the least to be dreaded.

The management of a large poultry-yard should be the office of one person. A good-tempered, cleanly girl may perform its duties well, if she be careful and attentive. No one else should be allowed to go into the hen-house, as the voice of a stranger will disturb the laying-hens. The hatching-house should be still more strictly guarded from the intrusion of strangers. The feeding of poultry should be regular. Their fattening and general well-being greatly depend on regularity. The same quantity of food given at uncertain intervals would not produce the same effect; and even when barn-door fowls may be supposed to gather up enough for their subsistence, it is desirable still to feed them (however small the quantity given) at stated times.

The keeper of the poultry-yard should know how to distinguish between different sorts of food. She should observe what appears to be heating, and what cooling to the fowls. She should well understand the different diseases which poultry are liable to, and what are the remedies. If the pip become prevalent, she should know that it is owing to a scarcity of fresh water, and take immediate steps to prevent this scarcity from occurring again. If the shells of the eggs are rather soft, it is a sign that the hens are becoming too fat, and that they need to have their food diminished, and chalk mixed with their water.

The food of fowls is various. Not only do they thrive on barley, wheat, and oats, (their principal dependence,) but on almost every kind of food that can be mentioned. Boiled potatoes, if given warm, are excellent food for them; also boiled peas and beans, carrots, turnips, parsnips, &c. Either of the latter kinds of root mashed up with bran or pollard, makes a substantial evening meal, when grain has been given in the morning. Millet, tares, rice, refuse from the kitchen, such as fruit, crumbs of bread or pie-crust, biscuit-dust, cuttings of greens, parings of apples, almost every *kind of refuse aliment* that can be named, is useful to

throw down to fowls. Even broth and pot-liquor, when mixed warm with bran or pollard, affords a nourishing diet, and is greedily eaten, although the liquor by itself would be refused. Fowls are also very fond of pieces of suet or fat, as well as of tender meat. They will pick bones more completely than almost any other animal. In Scotland, a hen and her chickens are sometimes carried out, in June or July, to the turnip-field, in a sort of basket, called a *brood-basket*. A large woollen cover keeps the family secure until they arrive



BROOD-BASKET.

at the field, when, this being removed, the chickens go out and pick up the larvæ and insects, which are so destructive to young turnip-plants. When a space is in this way cleared of insects, the brood-basket, with the mother enclosed, is moved to another place, and the chicks follow and proceed with their task. The same plan is found beneficial in gardens. This brood basket is also useful in the early spring; its warm covering affording protection to a large family of chickens in frosty weather. The basket opens at the end to admit the mother.

Persons who do not understand the management of fowls, are often disappointed to find that, after a time, their hens become unproductive, and lay very few eggs. The fault, doubtless, is in keeping the same stock too long. For the most part, cocks should not be kept more than three years, nor hens more than five years; but the best and finest of the young brood should be brought up to supply their place. Fowls may be considered in their prime at from two to three years old.

The hatching of eggs in the ordinary way, even with the best mothers, is necessarily a slow affair, and cannot be increased beyond a certain extent. But there have

been methods contrived from very early times, by which a large supply of chickens may be obtained by artificial means. These have been extensively carried on in Egypt, where several hundred ovens are regularly employed in hatching eggs during the season. The Egyptians are jealous of rivals in this art, and carefully keep some part of the process secret, although they allow strangers to examine the construction of the ovens, and even to witness the curious operations going on within. The great difficulty appears to be the regulation of the heat, which is managed by a set of men regularly trained, and licensed to this art. Of the total number of eggs committed at one time to the oven, the manager does not expect to hatch more than two-thirds: thus, out of 45,000 eggs, he is not obliged to return to his master more than 30,000 chickens. But if he succeeds in hatching more than this number, the surplus is his own perquisite, in addition to his wages of thirty or forty crowns, besides his board, which is paid him for his six months' work.

The Egyptian hatching-oven is a brick building, about nine feet high. A gallery extends from one end of the building to the other, having on either side a double row of rooms or ovens, one above the other, three feet high, four or five broad, and fifteen long. Each of these has a round hole for an entrance, wide enough for a man to creep through, and into each of the lower rooms are put four or five thousand eggs. The upper rooms are used for warming the lower. For the sake of a slow fire they burn the dung of cows and camels, mixed with straw, and dried into cakes. These are laid in a furrow or gutter, which runs along two sides of the brick floor of the upper rooms, and are burned for an hour morning and evening. The fumes escape through the doors into the gallery, where they issue through the roof. When the smoke has subsided, all openings are stuffed with tow, to keep in the heat, except a large opening in the floor of the heating-room, which allows

the warmth to be diffused in the room below. When the fires have been continued for eight, ten, or twelve days, according to the weather, they are discontinued, the heat acquired by the ovens being then sufficient to finish the hatching, which requires in all twenty-one days. At the latter part of the time some of the eggs from the lower room are removed into the upper, in order that the chickens may escape more easily from the shell, than they would do if they had a number of eggs piled up above them.

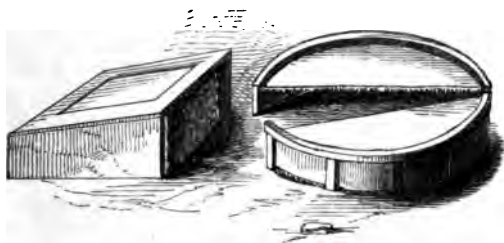
The process of artificial hatching has been carried on in some other countries, but never to the same extent as in Egypt. Some years since an exhibition was open in London, affording the curious sight of hatching eggs by steam. But uniformity of heat was not preserved, and the experiment was therefore not fully successful. A second attempt, and the application of machinery invented by Mr. Bucknell, were the means of hatching many thousand chickens, which were afterwards reared without difficulty. In a treatise on the subject, the inventor asserted, that by his machine, called the *Ecce-leobian*, a perfect and absolute command over temperature was obtained, from 300 degrees Fahrenheit to that of cold water; and that by this means the impregnated egg of any bird, not stale, placed within its influence at the proper degree of warmth, is, at the expiration of the natural time, brought into life, "without the possibility of failure, which is sometimes the case with eggs subjected to the caprice of their natural parent."

This machine, however, was far less certain in its operations than might have expected. A more perfect method has since been found, and this is now in successful operation at Heathfield, Sussex. The order of nature is followed, by applying "top contact heat;" that is, an equal warmth pressing on the eggs *from above*. This warmth is supplied by a reservoir of water, kept at an equal temperature, and contained in a waterproof

bag resting on the eggs, and answering the purpose of the hen. From eighty to ninety per cent. of the eggs are duly hatched.

Such an invention seems needed to increase the supply of poultry, which, in our great towns, is sold at an exorbitant price, and would be often unattainable at any price, were it not for the supplies received from the continent.

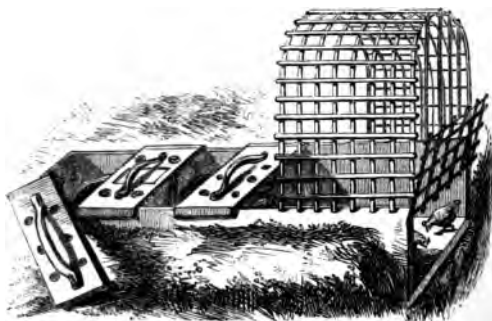
Supposing the artificial hatching of eggs to be performed on a large scale, it follows as a necessary consequence that there would not be enough hens to take care of them. Our French neighbours have provided for this want in a very ingenious manner. Réaumur, the naturalist, who was very successful in hatching eggs by artificial means, invented an apparatus, called an



ARTIFICIAL MOTHERS.

Artificial Mother, for supplying to the young chickens the warmth they would have had beneath their mother's wings. At first he thought that they might be reared for a fortnight or three weeks in the oven where they had been hatched, taking them out five or six times a day for food and water. But this plan, although it kept the chickens in warm air, did not supply to them the comfort and warmth of the mother's feathers gently pressing on their backs, as she sits over them. The chickens themselves showed this want, for instead of squatting,

as they naturally do when at rest, they stood upright, with their backs or sides pressing against the warmest part of the oven. Réaumur then made his artificial mother, which was a box lined with sheep-skin, with the wool on it, the bottom being of a square form, and the upper part sloping like a writing-desk, and open at the ends, or only covered with network. The slope of the cover allowed the chickens to arrange themselves according to their sizes, and the open ends prevented their being suffocated. This box was placed at the end of a sort of cage, covered with willow or wire, which served as a feeding-place for the young brood. The inventor speaks thus warmly in praise of this arrangement, and of the



ARTIFICIAL MOTHER. (*Improved form.*)

satisfaction shown by the chickens: "They soon showed me how sensible they were of the advantage of my artificial mother, by their delight in remaining under it, and pressing closely to it. When they had taken their little meals they jumped and capered about until they had tired themselves, and then hastened to the mother, going so deeply into it that they were obliged to squat. There is, indeed, no natural mother that can be so good for the chickens as the artificial one; and they are not

long in discovering this, instinct being a quick and sure director. Chickens, direct from the hatching oven, will begin to pick up and swallow small crumbs of bread; and after having eaten, and walked about a little, they soon find their way to the fleecy lodge, where they rest and warm themselves, until hunger again tempts them abroad. At night they all betake themselves to the artificial mother, and leave it exactly at day-break, or when a lamp is brought into the place, producing an artificial day-break." With the pardonable enthusiasm of an inventor, Réaumur goes too far in saying that the artificial is better than the natural mother; but there is no doubt whatever that his invention is a most ingenious and valuable one.

This contrivance is adapted for turkeys, pheasants, and other birds that do not go into the water, nor require to be fed by hand. For water-birds Réaumur contrived a pond, surrounded by turf, in the centre of the crib or feeding-place connected with one of the artificial mothers.

The marks of a chicken likely to become a good hen, are a small head, bright eyes, a tapering neck, full breast, straight back, plump oval body, and grey legs. A few such birds in the possession of cottagers would be a great addition to their comfort. We conclude our notice of these birds with the following useful hints gained from the Cottager's Manual. "Every man who keeps a pig should keep fowls. Three or four hens and a cock will prove no small addition to a poor man's stock; and a few potatoes and peelings, with the run of the pig's trough, which they will always keep clean, will be all they require in the summer; but to make them lay eggs when eggs are valuable, they must be well fed with oats, barley-meal, or Indian corn; have a dry place to roost in, and to shelter them from wet weather, and be kept quite clean. In the depth of winter, geese and other poultry must be fed, as they cannot obtain much out of doors; and if suffered to get

lean at this time, they will not lay well or early in the spring. Young pullets, nine or ten months old, are the best for laying in the winter. Ducks are both useful and profitable; they clean away much unsightly offal, will travel a great distance from home in search of food, require but little at home, and lay a great number of



THE DUCK.

eggs; but they are not good mothers, and seldom rear half their brood where there are many hedges and ditches in the neighbourhood. They likewise frequently drop their eggs in water, if not carefully watched when they are expected to lay. A hen answers better as a mother to ducklings, than their natural one. Not less than a drake and two ducks should be kept.

Geese and ducks belong to the family of flat-billed birds. Ducks, as being the most common, may be noticed first. Their natural place is on rivers, ponds, or other fresh waters; but they are often kept in spots where there is not enough water for them to swim in.

No doubt they thrive best where there is plenty of running water; but their flesh is said to be less delicate, and their eggs not so good in flavour when they are quite at large. On this account, and also because ducks are very filthy in their eating, some persons confine them within a pen, or small paddock, and feed them with good and proper food and water, until they are fit for the table. Certainly, where these birds are left to range as they please, the food they eat is such as would prevent much enjoyment of their flesh, were it known to those who have them served up at their tables.

The wild duck, or mallard, is a well-known water bird, and to this our tame varieties owe their origin. The ordinary duck, sold in the London markets, is the English or Aylesbury white duck, which is fattened in great numbers in some parts of Buckinghamshire and Bedfordshire, in the early spring. Very many families gain a comfortable livelihood by breeding and rearing ducks, the greater part of which are actually brought up at the cottager's fireside. Different broods are brought forward, so as to keep up a succession all through the season, when the best prices can be made. The interior of the cottages is fitted up with boxes, pens, &c., arranged round the walls, and presenting a very odd appearance to strangers. In these places the ducklings are reared under the care of the good wife, whose chief attention is devoted to this profitable employment. One labouring man, having only one room to live in, is mentioned as having, some years ago, sent up as many as four hundred ducks in a season, the greater part being sold at very high prices.

Another variety, of finer flavour than the preceding, is the dark-coloured Rouen, or Rhone duck, originally from France. The flavour of the flesh, in this as in all other ducks, is much influenced by the kind of food. On the banks of the Seine, in the neighbourhood of Rouen, this duck is said to thrive admirably on account

of the number of earth-worms found in the meadows, which are collected and portioned out to the ducks three times a day, under the roof where they are cooped up separately. These are the large fat ducklings seen in Paris in June. The Muscovy duck is a distinct species, much larger than the common duck, easily fattened, and a most voracious feeder.

Although it is possible to bring up ducks without the advantage of a pond or river, yet it is useless to attempt to rear them in very dry and barren places. Moisture is their element; therefore a marshy soil, or access to ditches, or swampy places, is highly desirable. For a considerable part of the year, ducks may be left to their own resources, or may merely receive a little grain or other food once a day. The grain of the poultry-yard, the siftings and sweepings of barns, all sorts of mealy substances, the residue of breweries and boiling-houses, herbage, vegetables, and fruits, are all acceptable to these birds. Moist food is preferred. They are particularly fond of boiled potatoes, and may profitably be fed with them instead of grain. Poulterers feed ducks on corn, and on ship-biscuit, broken and soaked in broth or beer, together with treacle and chopped mutton suet. On this diet the birds speedily become fat. Ducks are fond of meat, and eat it eagerly even when tainted. They are sometimes kept by butchers to feed upon the offal of their slaughter-houses, but such food makes their flesh rank and offensive, if not positively unwholesome. These birds will also gratify their ravenous appetites with slugs, spiders, toads, garbage, and insects. Thus, were it not for the damage they do to fruit, &c., they would be of great service in gardens. They generally lay their eggs by night, or before ten o'clock in the day. The colour of the eggs depends very much on that of the plumage. Some are pure white, others dark green, or blue, but *the shells* are always smoother and more glossy than *those of hens' eggs*. When boiled, the white does no

become curdy like that of a new-laid hen's egg, but transparent and glassy, while the yolk is much darker in colour. Ducks' eggs are chiefly used in pastry, being less delicate than those of the common fowl.

It has already been noticed that, in hatching duck's eggs, it is better to put them under a hen, because ducks are not good mothers. But if a duck be permitted to sit, it is well to let her have eggs that match in colour, for in some few cases she has been known to turn out with her bill those eggs which are not of the colour of her own. A Muscovy duck was once sitting on about nineteen common duck's eggs. When half the period of incubation had elapsed, the duck was one day observed, as she returned to her nest after feeding, to pass her bill over the whole of the eggs, and then to select one, and take it up in her mouth. This egg she conveyed to the distance of three or four yards from the nest, where she struck it a hard blow with her bill, breaking the shell and disclosing the contents, which were added. This fact has been related to the writer by a distinguished naturalist who was himself the witness of it.

During incubation, which lasts thirty-one days, the duck requires a secret and safe place, but not much attendance, as she takes more care of herself than the hen, and is sure to seek the refreshment of food and water at proper intervals. The chief fear is, that she will do this too often, and let her eggs cool. When the eggs are hatched, a coop should be placed either on the short grass, or under cover, according to the weather, and a wide and flat dish of water placed near it for the ducklings. Their first food should be either crumbled bread, sopped in cider, or some soft mixture, such as barley-meal. Whenever the mother finds herself at liberty, she will immediately take her young to the water, if there be any near, and they launch into it without hesitation. When ducklings are brought up by a common hen, or a turkey-hen, as is sometimes the

case, they greatly alarm their foster-parent by plunging into the first water they come near. The hen, not being able to follow them, is in the greatest terror and agitation, and endeavours by all the means in her power to call back her refractory family.

Ducklings are more independent than chickens, and do not trust so much to their mother's care. When they get a little strength they should be fed with any sweet herbs raw, chopped fine, and mixed with bran and water. Their propensity to insects, slugs, &c. will soon show itself, and even small fish will early become the prey of these voracious feeders. When the ducklings have been brought up by a hen, some care will be necessary in putting them with the old ducks, lest the latter should ill-treat them through jealousy. Young ducks are liable to many accidents, owing to their awkwardness out of the water. They have not so good a chance of escape from their foes as chickens, because of their heavy waddling gait; thus they sometimes get trodden on by cattle, and even by man. But their most dangerous enemy is the fox, who often finds them wandering away in search of water, and easily makes them his prey. The raven, and also the carrion crow, have been detected carrying off the young. A naturalist, willing to satisfy himself of the partiality of the crow for young aquatic poultry, put an old duck with her ten young ones into a pond, nearly three hundred yards from a high fir-tree, in which a carrion crow had built its nest. It contained five young ones almost fledged. "I took my station on the bridge," he says, "about one hundred yards from the tree. Nine times the parent crows flew to the pond, and brought back a duckling each time to their young. I saved a tenth victim by timely interference. When a young brood is attacked by an enemy, the old duck does nothing to defend it. In lieu of putting herself between it and danger, as the dunghill fowl would do, *she opens her mouth, and darts obliquely through the*

water, beating it with her wings. During these useless movements the invader seizes his prey with impunity."

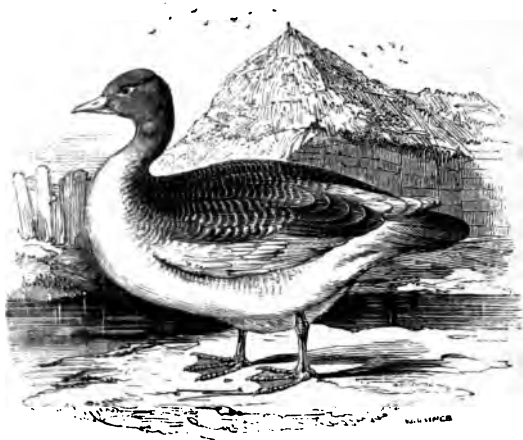
Ducks are sometimes fattened in confinement with plenty of food and water; and this plan had the advantage of restricting the birds to proper diet; or they will do well at greater liberty, but with access to as much solid food as they can eat. Oats, either whole or bruised, are better than barley for fattening ducks. Pea-meal is also good. Ground-malt, mixed with water or milk, is commonly used. Broth and pot-liquor may be profitably used to mix up the food of these birds, especially where they are prevented access to a pond.

The water in duck-ponds is sometimes infested by a dangerous enemy to the brood, namely, leeches, which fasten on the feet of the young ducklings, and cause their destruction. The way to get rid of these troublesome creatures is to stock the pond with tench and other fish which feed on them.

Another important tenant of the poultry-yard is the Goose, a bird which ranked high in former times, and is still a universal favourite. Geese are birds of the north more than of the south, being very abundant in polar countries. The structure of the goose adapts it either for land or water. The legs are not placed so far back as those of the duck, and therefore the goose is a much better walker than the duck. Geese in their wild state are migratory birds, coming southward in winter, and going back to their northern pastures in summer.

The tame goose is sometimes of a fine pure white, but oftener party-coloured, or grey mixed with white. There are others entirely grey, and though the feathers are less valuable, these are considered to be more fruitful and to give the finest goslings. When domesticated and well fed, geese become much larger than in their natural wild state. These birds are very profitable in the neighbourhood of commons, for they are more of vegetable feeders than ducks, and must be allowed to *range the pastures*. Although fond of marshes and

moist places by day, they always look out for a clean dry place to sleep in, and this should be afforded to them. They must, however, be carefully shut out from places where there are young trees, or growing crops of any description, or they will do great injury in a very short time. The only time when geese can be suffered to enter a kitchen garden, is when the chief crops are



THE GOOSE.

secured and refuse abounds. Stubble fields form an excellent walk for geese, where they pick up much corn as well as herbage. Geese, like ducks, provide largely for their own maintenance, but they require a little feeding. Boiled potatoes, beaten up warm with bran, and given to them (not too hot), will bring them forward at very little expense.

The goose is a voracious feeder, and will soon fatten if its wants are well supplied. An extraordinary size is attained by cramming geese, but such birds are often rank in flavour, and less wholesome than those which

are fattened in the natural way. Geese produced so late as June or July will fatten well on the stubble fields the same autumn, without any further feeding than a meal of potatoes and bran once a day. But early goslings, namely, those of March or April, will require good feeding, as they have no stubble fields. In order to be successful in rearing geese, a gander should be chosen, either of a pure white or of an ash-grey, not of two colours. He should be of large size, but active in his gait, with clear and lively eyes, and a loud voice. The geese (of whom there should not be more than four to one gander) should be chosen for weight of body, steadiness of deportment, and breadth of foot. They will begin to lay about the latter end of February, at which time they will be seen running about with straws in their mouths as if to prepare a nest. They should then be watched, and kept within bounds. If they can be induced to begin laying in nests prepared for them, they will not fail to continue laying in the same spot. A goose will go on laying until she have deposited from ten to twenty eggs, when she will probably show an inclination to hatch them. This will be detected by her keeping in the nest longer than usual, the gander, meanwhile, keeping watch. Fifteen eggs are as many as a goose can conveniently cover; these she may be allowed to sit upon without any interference except the bringing of food and water near to the nest every day. Some of the goslings begin to chip the shell about the twenty-ninth day; but as the eggs are hatched in succession, the goose sometimes remains sitting for nearly two months. The early hatched goslings are therefore taken away from their mother, lest she should be induced by her care for them to desert the rest of the eggs. The egg-shell of the goose is so strong that the young ones have some difficulty in making their exit. Where this is observed to be considerable, they may be assisted in getting free with less danger than attends the intermeddling *with the common chick*.

No attempt should be made to feed the goslings for twelve hours after they are hatched. Their food may then be bread soaked in milk, curds, or mealy potatoes mixed with bran, and not given too hot. A sunny and sheltered spot should be chosen for them. Cold winds and rain at that tender age will quickly destroy them. It is not safe to allow them access to water for the first day or two.

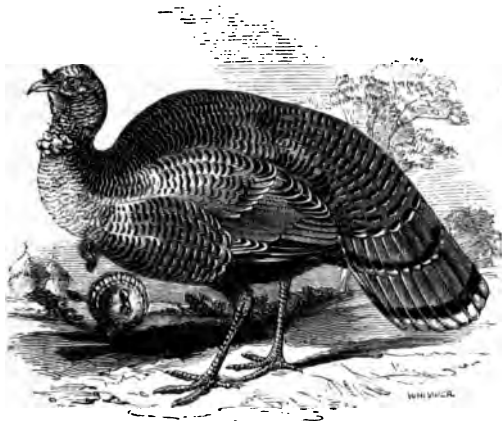
Geese are the noisiest of poultry; their loud gabblings on the least alarm are, perhaps, as good a protection to the farm yard as the barking of dogs. By giving the alarm to the Romans, and thus saving Rome from being captured by the Gauls, they became greatly venerated by that superstitious people. Our ordinary breed of geese is likely to be much improved by the recent introduction of a remarkably fine species from the shores of the Mediterranean, and also of some handsome birds from China.

Nowhere in this country are geese kept in greater numbers than in the fens of Lincolnshire, where they are reared for the sake of their feathers. They are stripped once or twice a year for their quills, and five times a year for their feathers, namely, at Lady-day, Midsummer, Lammas, Michaelmas, and Martinmas. It is said that in fine weather the birds do not generally suffer from this process, but if cold sets in about the time of the operation, numbers of them die. The old birds submit very quietly to be plucked, but the young ones are very noisy and unruly. Tame geese, when kept with a view to their eggs, and unmolested by plucking, &c., will live to a great age, even, it is said to eighty years or more. But few indeed are the instances where the bird is permitted to live out its natural term of days.

The **TURKEY**, in its wild state, is an extremely beautiful bird, of the most brilliant plumage, a native of America, whence it is supposed we received our tame variety about the year 1530. The best of our Turkeys are black, but there are varieties in colour from bronze

and copper-colour up to white. Moulting will sometimes occasion a great change in the plumage, but black turkeys are far more abundant, as they are more valuable than any other.

Turkeys are justly regarded as the most valuable of fowls, uniting a large size with peculiar delicacy of flavour. They require more care in the rearing than other fowls, but this is amply compensated by their ultimate value. The turkey-cock is recommended by an old writer to be "a bird large, stout, proud, majestic, for when he walketh dejected he is never good."



THE TURKEY.

One turkey-cock is generally kept to every dozen or fourteen hens, and in providing shelter for them it is necessary to remember the size of these birds, and the evident fondness they have for roosting in high places. Thus in warm summer weather, when allowed full liberty, they will be sure to choose a tree as their most natural roosting-place; and it can scarcely be consi-

dered otherwise than cruel to shut them into a low close hen-house, from which they show the most eager desire to escape. Open sheds, yet secured from moisture, and high perches, are what these birds require; a ladder being also necessary, lest they injure themselves in flying from their roosting-places.

The county of Norfolk is noted for rearing great numbers of turkeys for the London markets. But not only is it profitable to rear turkeys on a large scale, it is also a great advantage to a cottager to possess a few of these birds, for they find the greater part of their food themselves in the roads and hedges. Care should be taken, however, that they trespass not on the property of others, for they are exceedingly fond of grain, and at certain seasons are a great annoyance to the farmer, and should be carefully kept out of the way of mischief. Snails, slugs, and worms are also favourite morsels with the turkey.

In the month of March, the turkey-hen begins to show, by her increased animation and haughty step, that the laying season is at hand; and at the same time, if not prevented, she will wander abroad, and endeavour to steal away from observation. When these symptoms are observed, together with a peculiar note which she utters at this season, her owner should prepare a nest, and put a chalk egg into it, to induce her to lay there. She will usually lay in the morning either daily or every second day, the total number of her eggs being from fifteen to twenty; her mate must not be allowed to be present while she is laying, as he is apt to break the egg. Each egg, as it is laid, should be taken away, to prevent its being broken, or sucked by vermin; if put in a basket, in a dry and airy place, the eggs will keep very well till the hen has done laying; they are larger than those of a common fowl, and are of a dull cream-colour with reddish dots. Before the hen *has done laying*, she often shows a great anxiety to sit; *she clucks* like a common fowl, and remains persever-

ingly on the nest. It is better in this case to put eggs under her, taking care to mark them in order to distinguish them from those she may continue to lay, and which latter must be removed, as they would not be hatched at the same time as the rest, and would therefore be spoilt.

When the hen has been sitting for a month, the chicks make their appearance. Those which come out first must be placed in a basket of feathers, and kept in a warm place till the rest appear, when they may be all given to the mother. She appears, however, little competent to the task of feeding them, or teaching them how to feed themselves, and on this account a few common hen's eggs are sometimes put under the turkey, about nine or ten days after she has begun to sit, that the chickens, coming out at the same time with the little turkeys, may teach them how to eat. For a few hours after hatching the young turkeys require no food, but in some places a custom prevails of putting a peppercorn down the throat of each chick, then dipping its bill in water, and returning it to the nest. The peppercorn is doubtless given to gratify the love of stimulants, which turkeys are known to possess, but at this early stage it is much better to let the chick alone, and not force it with food for several hours. The first meal may be of hard boiled eggs chopped fine, and mixed with bread or curd, and a few sprigs of nettle and parsley, also boiled and chopped; this is made into a paste, and the chicks are encouraged to peck it from the palm of the hand. Some persons give chopped egg alone for the first fortnight, and say that it is the only safe food, on account of the tendency there is in young turkeys to fall into a sort of dysentery.

The turkey-hen and chicks are housed for a month after the hatching, unless the weather be particularly warm: if they appear to droop, a little powdered caraway-seed and cayenne pepper may be cautiously mixed *with their food*, taking care to avoid milk, which has a

purgative effect. The most critical period of a turkey's life is that at which it acquires the reddish colour of the full-grown bird; this occurs at two months old, and is called "shooting the red." Nutritive food seasoned with a little cayenne pepper, is the only thing that can be given to the chicks, who are now to drop



THE KITE.

that name, and be called *poults*. It may be remarked that all through their feeble days the mothers are most watchful protectors of the chicks; they can discern at a great height a bird of prey in the air, and immediately utter a peculiar cry, to warn the young of danger; and so well is this understood, that every chick will imme-

diately run and hide itself among the long grass or other plants within reach.

After the second month the poults are fed on common boiled plants, such as nettles, wild succory, milfoil, turnip-tops, cabbage-sprouts, or outside leaves well boiled down and chopped with a few mealy potatoes. When the poults are about five months old, it may be required to get them ready for the market. If so, let them be well fed twice a day with boiled potatoes mashed with meal, and given quite fresh each time. At the same time it will be desirable to keep them rather close, and to let them pass some time after each meal in the dark. By persevering in this plan for about a month, and taking care that great cleanliness and purity be observed in attending on the birds, they will be found sufficiently fat without forcing or cramming them. Eighteen or twenty pounds is a fair weight for a fat yearling bird; thirty is a good weight for a turkey of any age, and few exceed forty.

Perhaps a poultry-yard is scarcely complete without PIGEONS, and yet these birds are such persevering devourers of grain, that a large collection of them is not desirable for the farmer. The dove-cote or pigeon-house is with propriety placed at the top of the poultry-house, and is so constructed that every pair of pigeons has two holes or rooms to rest in. Without this there is constant confusion and breaking of eggs. The front of the pigeon-house should have a south-west aspect, with a platform at the entrance for the birds to alight and perch upon. The platform is painted white, and their holes are often white-washed within and without, the birds being much attracted by the whiteness of their dwelling, and being also very fond of the lime of the whitewash. Cleanliness and an ample supply of water are of the utmost consequence to these birds, as they are apt to suffer greatly from vermin. If they are kept in considerable numbers, a room or loft is set apart for their use, and is provided with shelves partitioned off into separate apartments, where the pigeons may sit in

privacy. They seldom take the trouble to make nests of their own, and therefore a basket, or an unglazed earthen pan, about three inches high and large enough



THE TURTLE DOVE.

conveniently to hold the pigeon and her young, is usually put in each nesting-place. The hen lays only two eggs, but when they are hatched she will lay the same number again, and hatch eight or nine times in the season. The duty of sitting is shared equally between the cock and hen, except that the hen always sits by night. The cock also helps to feed the young. Pigeons secrete a milky fluid in the crop, commonly called "soft meat." This only appears when they are breeding, and is a provision for the early nourishment of the young.

These birds live almost entirely on grain. Tares, peas, and the smallest kind of black or brown beans, called pigeon's beans, are their proper food; but all must be ripe and dry, for new grain is apt to scour them and do mischief. Like most other animals, they are fond of salt, but an excess of it is fatal to them. The scent of coriander and other seeds is pleasant to pigeons, and it is said to attract them strongly to their dove-cote, and to allure strangers.

A mixture of loam, sand, old mortar, fresh lime, bay-salt, cumine, coriander, carraway, and allspice, moistened with urine, is sometimes beaten up into a thick sort of mortar, and left for the pigeons to pick at. They are very fond of it, and, according to an old fancy, it keeps them in health. A piece of board should be placed on this mixture, that the pigeons may not scatter and dirty the lump as they alight upon it. The pigeon is not in such high repute as in former days, but is still sufficiently esteemed as a delicate article of food, to make it worthy of attention among our domestic poultry.







ONE of the most beautiful sights of Spring is the blossoming of fruit-trees, especially of cherry and apple-trees, in orchards and gardens. The delicacy and fragrance of the blossoms, opening before the leaves appear, and the rich profusion with which they clothe the brown and rugged stems, offer a beautiful contrast to the general aspect of chilliness which lingers about the early Spring. The early appearance of these blossoms is, indeed, to the gardener almost a matter of regret; for they sometimes meet with a severe check, or have the young fruit nipped and destroyed by the sharp frosty nights of April and May.

The dangers of frost and blight once over, the promise of the Spring is richly fulfilled in Summer and

Autumn, and a vast quantity of wholesome and grateful fruit is supplied for present use, and for future store. Besides the profitable employment of the apple and pear in certain parts of the country called the cider districts, where the crop is annually manufactured into cider and perry, there is also an immense and constant demand for the produce of orchards in all large towns; so that gardeners, cottagers, and others living within a convenient distance of such towns, are sure of a ready market for the fruit, and are well repaid for any labour and care they may bestow on the management of orchard trees. Sometimes, through neglect, injudicious pruning, or other mismanagement, apple and pear-trees do not yield half the produce they might reasonably be expected to bear; but under experienced hands, and in favourable seasons, the load of fruit obtained from these trees is quite astonishing. In many cases the weight of the crop would actually break down the branches, were they not artificially supported on props. A goodly sight it is to see a cottage-garden thus richly decked, and it is not, happily, an unknown sight, though more rare than it was formerly. In some parts of Wiltshire and Hampshire, the little crowded cottage garden becomes a picture of beauty in the early Spring, from the mass of pink-tinged blossoms that cover the deformed and straggling branches of the fruit-trees; and later in the season, the same small enclosure may be seen, rich in golden fruits, carefully propped up and tended by some white-haired peasant, now past work.

No doubt the industrious and good management of the little plot of ground, generally attached to the labourer's cottage in rural districts, might often renew these pleasing scenes, and greatly add to the comforts of cottagers. It has indeed been said that no labourer who has a clever, cleanly, industrious wife need be without a little store of cider or perry, and a good supply of wholesome fruit, the produce of his own

ground, provided he has room to plant two or three standard apple-trees and pear-trees, and also some gooseberry and currant-bushes. Even the walls and roof of the cottage might be covered with fruit-bearing trees; and how much more pleasing this would be to the eye, and how much more profitable to the owner, than the bare and naked walls too commonly seen !

Cottagers are little aware how much good might be done to themselves and their families by this attention to their garden ground. The owner of the cottage, well pleased to see things made the most of, would be disposed to give a little help towards stocking the garden. Every one would look with pleasure, as they passed by, at the neat and orderly appearance of the cottage, and would feel disposed to respect the owner, and to do him any good turn in their power. A strange contrast indeed it is when one industrious person thus cares for and improves his ground, while his neighbours allow theirs to lie neglected. The writer remembers such a case, where out of six cottages, near together, only one could be looked on with entire satisfaction. Each cottager had a nice strip of garden ground, and kept a pig; but while heaps of rubbish and patches of weeds deformed too many gardens, there was one always neat and well managed. The little path through this garden was bordered by gooseberry and currant-bushes, and fringed with pot-herbs. The beds were neatly laid out, and no waste or weedy corners left. Crops of cabbage, potatoes, and onions, and little patches of radish and lettuce promised well for the cottager's comfort; while near the cottage, and so placed as not to over-shadow the crops, were a few well-tended trees of larger growth. The cottage itself peeped out prettily from a mass of foliage, and a tiny flower-bed, just beneath the window, added to its attractions. Very sweet, at evening time, was the scent of the wall-flowers from this miniature flower-garden; and you were all the more disposed to linger over them

because the cottager's wife, with her clean cap and smiling face, and her baby in her arms, was sure to come to the door to greet you with a curtsy and a word of welcome.

There can be little doubt but that in such villages as we are describing, where the master takes an interest in his people, and allows them a little ground on advantageous terms, and where the clergyman exerts his powerful influence in promoting the domestic comforts as well as the spiritual welfare of his flock, numbers of labourers might add considerably to their humble wages, and at the same time greatly increase their own respectability and happiness by the good management of garden ground.

It is a happy circumstance that the most profitable and wholesome fruits are very easy of cultivation, and will thrive in almost any situation. Apples, pears, and cherries belong especially to temperate climates, so that it has been said, wherever an oak will grow, there these fruits may also be found. In many parts of Germany the apple is a common road-side tree, planted for a mile or two in the outskirts of towns, and left with its tempting load of fruit without the least protection. Out of the numerous passengers along the road not one is seen to step aside to pluck the fruit; and children playing beneath the trees do not seem to have the slightest inclination to theft. Such is the influence of habit and of a strict enforcement of the laws. Many of these way-side trees are extremely productive, although their foliage is obscured with dust, and they have frequently a stunted appearance. A few months ago the writer saw a large apple-tree, in the neighbourhood of Frankfort, so heavily laden with fruit, that fifteen props were necessary to support the branches.

Apple-trees require a deep and tolerably rich soil, and are all the better if placed on ground which *slopes* to the south. A very low situation for the orchard is bad; because the blossom is more liable

to be injured by frosts, where fogs and damp prevail; and also because the trees themselves soon become mossy, and tend towards decay. In the case of cottagers, where every inch of soil is of consequence, it has been recommended that they should make the fences of their gardens entirely of fruit-bearing trees. Thus a writer on cottage husbandry remarks:—"In many parts of the country, all the plums, and even all the apples and pears, which a cottager could require for drink-making and cooking, might be grown in his ring-fence; by allowing the plants to attain their natural height, and by trimming the sides of the fence to the height of seven or eight feet, allowing the shoots above that height to spread out either inwards only or on both sides, according to the nature of the adjoining surface. We have seen such hedges in Worcestershire, and in different parts of the Netherlands and Germany, thirty feet high, three feet wide at the bottom, two feet wide at the height of eight feet, the space between proving an impenetrable fence, and twenty feet wide immediately above. Where, from the nature of the soil or climate, neither the apple, pear, nor plum will make hedges of this description, the sloe-thorn may be employed, the fruit of which may be used for all the purposes of the damson. In good soil, the sloe will grow thirty feet high. The white-thorn should never be planted as a fence to a cottage garden when the black-thorn can be got; the latter forms as good a fence, and has only one objection common to all the genus *Prunus*, that of being prolific in suckers; these, of course, the cottager must take care to remove. A sloe-hedge once established, on the sheltered and warmest sides of it different varieties of plums may be grafted; the more hardy kinds on the east and west aspects, and the better kinds on the south side of the northern boundary. A south wall, it is estimated, is equivalent to the removal of the trees which are trained against it, seven degrees further to the south; if we take the

effects of the south side of a hedge as equivalent to one-third of the effects of a south wall, we shall find no situation in Britain or Ireland in which the cottager may not grow apples, pears, plums, and cherries. The principle is to form the hedge of a double row of wildings; and when it is grown five or six years, to cut down the inner row, and graft it with the cultivated varieties of the species; apples on a crab hedge, on hawthorns or quinces; pears on wild pears, on hawthorns, mountain-ask, or service; plums on sloes, and cherries on bird-cherries or geans."*

Where there is space for a regular orchard, the soil should be early and well prepared, in a spot where the subsoil is dry; and then about October or November, as soon as the leaves are dead or discoloured, the proper time has arrived for transplanting the young trees from the nursery to the orchard. When this is carefully done, the young trees will send out a few rootlets before winter, and will be prepared for vigorous growth in the spring. It must greatly depend upon the size of the orchard whether any other fruits than the most common sorts be planted therein. The general stock consists of apple, pear, plum, and cherry-trees. To render a large orchard very complete, however, it should contain quinces, medlars, mulberries, service-trees, filberts, Spanish nuts, and barberries, as well as walnuts and chestnuts. The last two, being well adapted for shelter, might help to form the boundaries of the orchard, being set a little closer than ordinary for that purpose. But whatever the size of the orchard, the larger proportion of trees should always be of apple, on account of their superior usefulness.

This valuable fruit, which is now so common and so completely naturalized in this country, is probably of Eastern origin. The prophet Joel mentions it among

* This plan of making the fence of fruit trees can only be adopted in gardens of tolerable size: in small gardens it would too much overshadow the soil.

the trees of Syria, in the following passage: "The vine is dried up, and the fig-tree languisheth; the pomegranate-tree, the palm-tree also, and the apple-tree, even all the trees of the field are withered." Chap. i. v. 12. Apple-trees and their fruit are also mentioned several times in the Canticles, and allusion is likewise made to the fruit in the Book of Proverbs. But those peculiar arts which have so greatly increased the value of fruit trees appear to have been discovered at a much later period. No mention is made of the art of grafting, for instance, throughout the Old Testament Scriptures; yet it must have been well known to the Romans at the time when St. Paul wrote his epistle to them, for he illustrates the position of the Gentiles in the Church of Christ, by comparing them to a wild olive-tree, grafted contrary to nature into the true olive-tree, from which some of the branches (the Jews) had been broken off. The Roman historian Pliny, also, mentions the art of grafting, describing certain apple-trees which would "do honour to the first grafters for ever."

The better sorts of apples were gradually introduced into England from the Continent; but there is one sort maintained by some writers to be of the native growth of this country. This is the golden pippin, a very small but delicious apple, called by French writers *pomme d'or*, and also *Reinette d'Angleterre*. Of the most ancient sorts procured from abroad were the *Nonpareil*, said to have been brought from France by a Jesuit in the time of Queen Mary, and first planted in the gardens of Oxfordshire; and the *Oslin* or *Arbroath pippin*, a Scotch variety, either introduced or extensively cultivated by the monks of Aberbrothwick. The more delicate apples for the table seem to have been little known until the end of the sixteenth century, but from that period they made great progress. In the time of Shakspeare pippins were among the delicacies of the dessert, and fifty years later, apples had become a very general article of national consumption. It was in the

reign of Charles I. that cider orchards began to be planted in Herefordshire; and when cider was first manufactured, so great was the estimation in which it was held, that it was expected to supersede the use of foreign wines. In the time of Charles II., cider was the general beverage; and in later reigns its manufacture was much encouraged and recommended, especially when our country was engaged in wars with France, and when it therefore became an act of policy to discourage as much as possible the use of French wines. While the cider districts were thus becoming celebrated and important, the general cultivation of the apple also improved, and several fine old varieties were brought into common use. Some of these varieties are now lost; but we have a great abundance of new varieties in the place of them.

While some plants scarcely vary at all, others are subject to almost endless varieties; and this is the case with the apple. In its wild state the apple is nothing more than the sour crab of our hedges; but in its domesticated state, it seems susceptible of improvement to almost any extent. About fourteen hundred varieties of apple are described in our modern works on Horticulture, and this is said to be not more than half the number really known. This being the case, it will be necessary to name only a few of the most esteemed sorts. The *White Juneating* is one of the earliest table apples. It ripens in July, and being sweet, and slightly perfumed, is a welcome addition to the dessert. The *Summer Golden Pippin* and the *Red Quarrenden* are also excellent early dessert apples. Later in the season the *Early Nonpareil* the *Red* and *Yellow Ingestrie*, the *Autumn Pearmain*, the *Kerry Pippin*, and the other favourites arrive to vary the dessert; while in winter there is a further change in the abundant and delicious *Ribston Pippins*, *Downton Pippins*, *Golden Reinettes*, *Sykehouse Russets*, &c. The varieties fitted for kitchen use are also exceedingly numerous, among which for summer use *Codlins* are universally known and valued.

If we trace the cultivation of the apple to the commencement, we find that the first step is the preparation of a soil of good quality as a nursery-ground. For this purpose the land should be trenched eighteen inches deep, and planted with young plants of the crab raised from seed, and one year old, each plant being placed at the distance of six feet from the others. These plants will be fit for grafting the following year, that is, when they are two years old; and during the early period of their growth they will not be injured, but rather benefited, if the ground be planted with potatoes, or other low-growing crops, and be regularly manured.

The next operation is grafting, and this is indeed a curious and interesting art. To those who have never witnessed the operation and its effects, it is indeed a wonderful sight to see that by cutting down a tree, bearing small and unprofitable fruit, and fitting closely and binding to it a shoot from a tree bearing large and delicious fruit, you get a flourishing tree bearing the same rich fruit as that from which the shoot was taken, and not partaking at all of the nature of the sour, inferior produce of the stock. It is a very interesting fact with respect to grafting, that there must be a near relationship between the trees, otherwise the operation will not succeed. No doubt St. Paul knew this, or he would have chosen some greater contrast than the wild olive and the true olive, when he described the grafting in of the Gentiles to the Christian church. Some spurious grafts have indeed been contrived, so as to give the appearance of several trees flourishing on the same stock; but these have either been deceptions, or short-lived attempts to force an opposition to natural laws.

Many advantages arise from grafting. Approved varieties of trees are thus multiplied with very little trouble, and their peculiar flavour and richness preserved. If there is a tendency to weakness in the original tree, it is often checked in the young scions or shoots, by inserting them into vigorous and healthy

stocks: they thus get increased strength, without deterioration of flavour. If the young scion, on the contrary, be over-luxurious in its growth, and therefore likely to be deficient in bearing, it receives a seasonable check by being grafted to a slow growing stock.

There are several common methods of grafting, such as *whip*, or *tongue-grafting*, *cleft-grafting*, *crown-grafting*, and *saddle-grafting*; and there are very many little differences in the way of performing the operation.

Whip-grafting is done as follows:—The stock is cut through in a sloping direction, leaving a clean smooth surface exposed. The young scion is also cut in the same slanting manner, so as to fit the stock and be the exact counterpart of it. A thin wedged-shaped tongue



is made very near the upper part of the slope of the scion, and a nick is made in the stock for this tongue to fit into. The scion is then accurately fitted to the stock, and secured to it with strips of matting being afterwards further protected by grafting clay, or some other composition, pressed round the stem, which effectually keeps out the air, and also preserves the graft firm in its place until the union of scion and stock be complete.

In cleft-grafting the stock is cut or sawn across in a horizontal instead of a sloping manner, and in the surface thus exposed, a cleft is made with a strong knife and hammer, or sometimes even with a bill-hook. The graft is then cut into a sort of blade two inches long, and the split in the stock being kept open with a chisel, the graft is placed in it, and (the chisel being removed) the split closes firmly on it, and keeps it in its place. It is, however, secured with matting and with clay, as in the former case.



Crown-grafting is performed on large limbs with thick bark, or on large stems. The limb or stem is sawed

through horizontally. A flat piece of smooth hard wood or ivory is then slipped between the bark and the wood, so as, in fact, to make a small cleft or opening for the insertion of the graft. The latter, being properly thinned, is slipped into this cleft, and perhaps two or three other grafts are placed round the same limb, in clefts made in the same manner between the bark and the wood. A smooth cord is then passed round the stock, and the exposed parts are covered with clay.



Saddle-grafting is so called, because the stock is cut into the form of a wedge, and the graft is cut in the reverse form, so as to fit over it like a saddle. This is generally a very successful mode of grafting if carefully performed.

There are other operations called *inarching* and *budding*, but these we cannot dwell on. The former is a means of grafting, *by approach*, the branches of different trees which happen to grow near each other; the latter is the transferring of buds, with a small portion of the surrounding bark, from one tree to another.



Grafting-clay is prepared of three parts blue or yellow clay or brick earth, one part fresh horse-dung free from litter, and a small portion of soft cut hay or hemp. These are mixed together with a small quantity of water, and beaten until the mass is firm and yet flexible. Grafting-wax, which is a mixture of pitch, rosin, bees'-wax, and turpentine, is not so good as clay for the purpose.

To return to the cultivation of the apple-tree. Grafting is performed at two years old; but it will be five or six years longer, before the trees will come to their full bearing. Yet the trees, if well managed, will yield much fruit when they are young. Supposing them to remain in the nursery ground until their branches begin

to interfere with each other, every other tree, and perhaps every other row of trees, will have to be transplanted to some other situation. When they are planted out with an especial view to cider, all the trees of the same sort or quality should be placed in distinct rows, by which means the fruit ripens together, and can be easily kept separate from such as may ripen later. To transplant the trees successfully, the greater part of the side branches must be taken off, and the roots carefully preserved from mutilation. The hole prepared for the roots must not be deeper than that in which they formerly grew; but abundant space must be left for spreading them out in a natural manner on all sides, before the soil and turf be covered in upon them. Each of the transplanted trees, during the first year, will require a stake and a few bushes to protect it; after which, the washing of the trunk once a year with lime and water, and cow-dung, will defend it from the teeth of animals grazing in the orchard.

Different names are applied to apple-trees according to their different modes of training. Those we have been speaking of are called *standards*, and are mostly employed in orchards and cottage-gardens; smaller kinds being now used for kitchen-gardens in general. Standards require little care beyond that of providing them with a straight stem six feet high, and three or four healthy shoots to form a head. These must be afterwards pruned, so that they do not chafe against each other in windy weather. The trees chiefly planted in modern gardens are *dwarfs*, which are kept back, by repeated and judicious pruning, to a very small compact size. Their fruit is often finer than that of standards, while it is much more convenient to gather, and less liable to be blown down. Dwarfs have other advantages in the small space they occupy, and in their not overshadowing the soil. *Espalier* apple-trees, or those trained on a frame, were formerly much used; but have now almost generally given way to dwarfs, which are

less difficult to manage, and less expensive. Some trees are called *Balloons*, from their branches being trained in a peculiar shape, by means of strings and a hoop, until they present a balloon-shaped head. These trees present a beautiful appearance when in flower; but the mode of training causes their buds to be so much exposed to the influence of frost, that they often suffer more than other apple-trees.

The pruning of young apple-trees is very beneficial to them, when performed in a skilful and judicious manner; but when the trees grow old, the less they are pruned the better. The lopping of large branches is generally very injurious to the tree; it exposes the sapwood to the atmosphere, and produces canker and decay. The first object in pruning is to remove superfluous and too luxuriant shoots, and this cannot be better done than in the youth of the tree. By this means light and air are admitted to all parts of the tree, and a crowded growth is prevented; and even those shoots which are allowed to remain will require checking in their exuberant growth, for the shoots which terminate each branch are unfruitful, and it is only the side shoots that are fertile, and these only when they are stunted in their growth, and form what are technically called *spurs*. By shortening back the leading shoots every year to a greater or less degree, according to their strength, the sap is checked, and forced into the side buds, which soon begin to form branches, some of which are sure to be fruit-bearing ones, for their growth will again be seasonably checked by the lengthening of the principal branch, which will now send forth new buds near the extremity, and will again grow rapidly as before. The fruit-spurs, as well as the leading branches, when they show a disposition to lengthen, should have that tendency stopped by pruning.

The trees of an orchard, especially apple-trees, are liable to injury, not only from frosts and storms, but from *blight* and parasitical plants; and before we no-

tice the fruiting of the trees, and the business of ingathering, it will be desirable to give an account of the evils which thus check the productive powers of the trees, and disappoint the hopes of the gardener.

American or white blight (*Eriosoma mali*) is perhaps the most destructive pest of the orchard. This insect is said to have been brought to this country from France in the reign of Louis XIV., when a colony of refugees settled at Paddington, where this sort of blight soon committed great ravages. Others affirm that it first made its appearance in a nursery-ground at Chelsea, being probably imported from North America. From whatever quarter, it certainly made great havoc in the nurseries of the metropolis, and was speedily distributed



BLIGHTED BRANCH.

throughout the country. The best account of this insect we have yet met with, is given in the Journal of a Naturalist, and is as follows:—"In the Spring of the year a slight hoariness is observed upon the branches of certain species of our orchard fruit. As the season advances this hoariness increases; it becomes cottony, and towards the middle or end of summer, the under sides of some of the branches are invested with a thick downy substance, so long, as at times to be sensibly agitated by

the air. Upon examining this substance, we find that it conceals a multitude of small wingless creatures, which are busily employed in preying upon the limb of the tree beneath. This they are well enabled to do by means of a beak terminating in a fine bristle, which, being insinuated through the bark, and the sappy part of the wood, enables the creature to extract as with a syringe the sweet vital liquor that circulates in the plant. This terminating bristle is not observed in every individual; in those that possess it, it is of different lengths, and is usually, when not in use, so closely concealed under the breast of the animal as to be invisible. In the younger insects it is often manifested by protruding like a fine termination to the body; but as their size increases the bristle is not in this way observable. The sap-wood (*alburnum*) being thus wounded, rises up in excrescences and nodes all over the branch and deforms it; the limb, deprived of its nutriment, grows sickly; the leaves turn yellow, and the part perishes. Branch after branch is thus assailed, until they all become leafless, and the tree dies.



AMERICAN BLIGHT.
(Magnified.)

"Aphides attack the young and softer parts of plants; but this insect seems easily to wound the harder bark of the apple, and by no means makes choice of the most tender parts of the branch. They give a preference to certain sorts, but not always the most rich fruits; as cider-apples and wildings are greatly infested by them, and for some unknown cause, other varieties seem to be exempted from their depredations. The Wheeler's russet and Crofton pippin I have never observed injured by them. This insect is viviparous, or produces its young alive, forming a cradle for them by discharging from the extremities of its body a quantity of long, cottony matter, which, becoming interwoven and entangled, prevents the young from falling to the earth, and completely envelops the parent

and the offspring. In this cottony substance, we observe, as soon as the creature becomes animated in



THE INSECT FORMING A CRADLE
FOR ITS YOUNG. (*Magnified.*)

the Spring, and as long as it remains in vigour, many round pellucid bodies, which at first sight look like eggs, only that they are larger than we might suppose to be ejected by the animal.

They consist of a sweet glutinous fluid, probably dis-

charged by the aphid, as the first food of its young.

* * * * The winds wafting about small tufts of the downy matter, convey the creature with it from tree to tree throughout the whole orchard. In the autumn, when this substance is generally long, the winds and rains of the season effectually disperse these insects, and we observe them endeavouring to secrete themselves in the crannies of any neighbouring substance. Should the savoy cabbage be near the tree whence they have been dislodged, the cavities of the under sides of its leaves are commonly favourite asylums for them. Multitudes perish by these rough removals; but numbers yet remain, and we may find them in the nodes and crevices, on the under sides of the branches, at any period of the year, the long cottony vesture being removed; but still they are enveloped in a fine short downy clothing, to be seen by a magnifier, proceeding, apparently, from every suture or pore of their bodies, and protecting them in their dormant state from the moisture and frosts of our climate. This aphid, in a natural state, usually awakens and commences its labours very early in the month of March; and the hoariness on its body may be observed increasing daily; but if an infected branch be cut in winter and kept in a warm room, these aphides will awaken, speedily spin their cottony nests, and feed, as they are accustomed to do in the genial season."

Such is the American blight when left unmolested ; but as soon as it makes its appearance on a tree, the utmost care should be taken to clean every part of the bark with a hard brush, and some searching wash ; for unless this be done, it is very likely to spread over all the trees in the orchard or neighbourhood. It is even considered better to sacrifice two or three much infected trees entirely, than to allow this pest to spread. When the blight has made considerable inroads on a tree, and has penetrated too deeply to be removed by a brush, a method may be employed such as is recommended in the following extract from the work already quoted :—

“The same unknown decree which regulates the increase and decrease of all created beings, influences this insect ; yet wet seasons, upon the whole, seem genial to its constitution. In the hot, dry, summer of 1825, it was abundant everywhere ; in the spring of 1826, which was unusually fine and dry, it abounded in such incredible luxuriance, that many trees seemed at a short distance as if they had been whitewashed ; in the ensuing summer, which was a very dry and hot one, this cottony matter so entirely disappeared, that to superficial observation the malady was not in existence ; and it did not become manifest again until September, when, after the rains of that season, it re-issued in fine, cottony patches, from the old nodes in the trees. Many remedies have been proposed for removing this evil, efficacious, perhaps in some cases, upon a small scale ; but when the injury has existed for some time, and extended its influence over the parts of a large tree, I apprehend it will take its course and the tree die. Upon young plants, and in places where a brush can be applied, any substance that can be used in a liquid state, to harden into a coat, insoluble by rain, will assuredly confine the ravages of the creature and smother it. I have very successfully removed this blight from young trees, and from recently attacked places in those more advanced, by an easy application. Melt about

three ounces of resin in an earthen pipkin, take it from the fire and pour into it three ounces of fish oil; the ingredients will perfectly unite, and when cold, acquire the consistence of honey. A slight degree of heat will liquefy it, and in this state paint over every node or infected part in your tree, using a common painter's brush. This I prefer doing in Spring, as soon as the hoariness appears. The substance soon sufficiently hardens, and forms a varnish which prevents any escape, and stifles the individuals. After the first dressing, should any cottony matter appear round the margin of the varnish, a second application to these parts will, I think, be found to effect a perfect cure."

Another great enemy to full grown apple-trees in orchards is *mistletoe* or *misseltoe* (*viscum album*), a parasitic plant, fixing itself in the bark of several trees, such as the oak, poplar, lime, apple, almond, and olive; but in this country, most commonly seen on apple-trees. This is not the place to describe the veneration paid in former days to the mistletoe of the oak, which was held by the Druids as a sacred plant. We have here simply to notice it as a pest of the orchard, especially in the cider counties, where it is often permitted to become extensively injurious. The seed of this plant being once deposited, by birds or otherwise, on the bark of a tree, a little rootlet issues forth, and swelling out at its extremity, like the mouth-piece of a hunting-horn, it takes fast hold of the bark, and finally extends itself between the inner bark and the soft wood, where the sap is most abundant, sometimes sending up suckers at a distance from the spot where the root entered. Thus the plant derives its whole nourishment from the tree, which is naturally weakened and impoverished thereby; indeed, when several plants occupy the same branch, the latter generally withers away and dies, the parasites also dying with it. The best cultivators of orchards in the cider districts are very careful to check

this evil as soon as it begins to make its appearance. The usual method of clearing the trees, is by pulling off the mistletoe with hooks in frosty weather, when the plant becomes brittle and easily severed from the tree.

A labourer will sometimes clear fifty or sixty trees in a day; a fact which proves the extent of the pest to be much greater than persons not living in the cider districts have any idea of.

When the difficulties of the season have been encountered or surmounted, and the crop of the cider orchards is ready for gathering, the almost universal custom is to strike the trees with poles (this is called *poulting*), and then to gather up the fallen crop. It is much to be wished that this practice were not so general, for much of the young bearing-wood is often broken by the violence used. Some cultivators adopt the better method of sending men or boys into the trees to shake the branches. In this case only such apples as are ripe fall to the ground, and the operation must be therefore performed at two or three different times; this is doubtless the reason why the more expeditious method of knocking down the fruit has become so frequent.

The mixing of all kinds of apples in different stages of ripeness is avoided by the best cider makers, as tending to produce unequal and repeated stages of fermentation, exhausting the strength and injuring the quality of the liquor. Therefore the fruit is kept separate until it is milled and expressed, when it is fermented together according to the judgment of the manager.

The fruit should not only be collected separately, but kept till perfectly mellow. For this purpose it is usually placed in heaps about a foot in thickness, and fully exposed to the sun, air, or rain, without covering, except in very severe weather. Rotten apples should be removed from the mass. When the experience of the cider-maker determines that the fruit is sufficiently mellow, it is ground separately. In this way, if desired,

fine cider of different flavours and of different degrees of strength may be obtained from the same orchard, and mixed afterwards, according to the pleasure of the owner. But it may be added that this requires skill and experience on the part of the maker, and has sometimes failed in private hands; so that the old method of making cider with mixed fruits is on the whole more likely to succeed, under common management, than that of the separation of the fruits.

There are two great districts in which cider is extensively made: these are the Herefordshire district, and the Devonshire district, each of which includes several counties. The cider made in the former district is strong, but harsh and acid; that of the latter is sweet and delicious, often equalling, if not surpassing, the lighter descriptions of wine. In fact, the best and sweetest cider is largely used in the adulteration of wines, or rather it forms the staple of many wines of superior flavour, sold as foreign.

The manufacture of cider is conducted in a rude and imperfect manner. The mill in which the apples are ground is worked by horse-power in large cider-makings; but for private use the hand-mill is much employed. A horse-mill consists of a circular stone trough for the apples, about eighteen feet across, called the *chase*, round which a heavy circular stone, called the *runner*, is turned by one or sometimes two horses. In this way the fruit is ground until it is entirely reduced to a pulp called *must*, which will pass without lumps between the fingers, and which shows by the white spots in it, that even the pips of the apples have been crushed in the process.

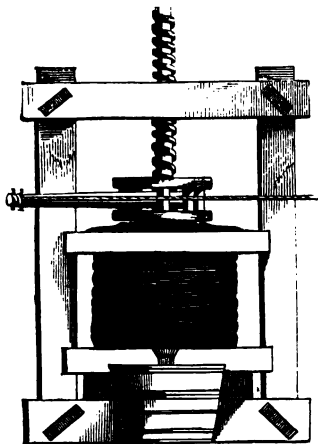
The hand-mill * consists of two wooden teathed rollers, or, which is preferable, two iron-fluted ones, arranged in the manner of other mills, with a feeder at the top, and the means of turning by hand. As the cylinders are capable of being removed to a greater or less distance

* See Vignette at p. 259.

from each other, they are gradually brought nearer as the pulp becomes finer, so that at last not even a pip can pass unbruised.

The hand-mill cannot be used so expeditiously as the horse-mill, but it is capable of being altered in its character by the attachment of a large horizontal wheel and horse, as is sometimes done.

When the apples are reduced to the state of *must*, a large horsehair cloth is spread out on the cider-press, and some of the must poured into it from a pail. The ends of the cloth are then folded over, and another is laid upon it and filled in the same manner. Ten or twelve of



CIDER-PRESS.

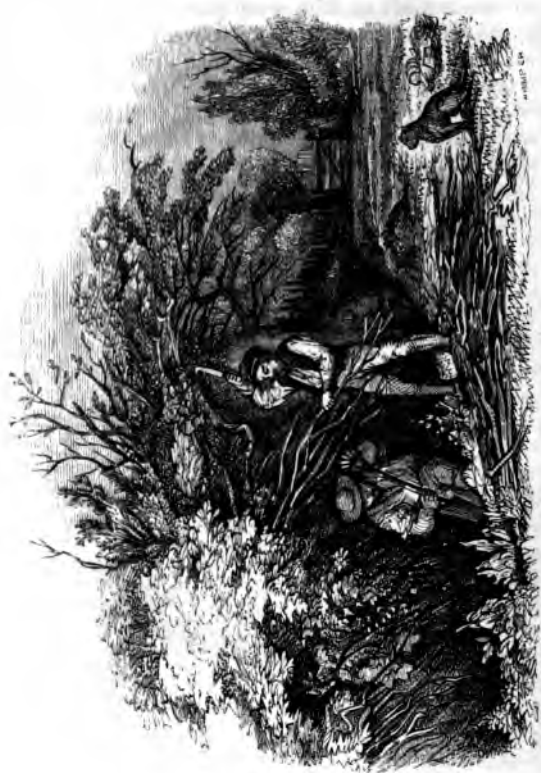
these hair-cloths are thus filled in succession, and then surmounted with a frame of thick boards, upon which a screw is slowly worked down by means of a lever. The pressure causes a thick juice, which is the cider, to ooze forth from the hair cloths, and this being repeated two or three times, leaves nothing behind but the dry must.

This is sometimes mixed with water, ground again, and the liquid pressed out as before. The inferior beverage thus prepared is called water-cider, and is drunk early in the year. In the Devonshire cider-press, reed or unthrashed straw, instead of hair-cloth, is spread in layers to receive the fruit. The juice which oozes from the hair-cloths or reeds runs off in a channel in the frame of the press, into a flat tub called a *trin*. From this tub it is poured with buckets or racking cans into casks placed where there is a free current of air. In three or four days fermentation usually begins; the thicker parts of the liquor will then subside to the bottom of the cask, and the lighter become bright and clear. All the bright portion is now drawn off into another cask, and the sediment strained through linen bags, the liquor thus obtained being put with the rest. The difficulties connected with cider-making at this stage of the proceedings have been thus described. "It is during the fermentation that the management of cider is least understood and there is the greatest hazard of injury. It is necessary to know what fruit will, by itself, make good cider, which kinds should be ground together, and what proportions should be mixed. But it is in the preservation of strength and flavour, after the cider is ground, that the principal difficulty consists; *slight* fermentation will leave the liquor thick and unpalatable; *rapid* fermentation will impair both its strength and durability; *excessive* fermentation will make it sour, harsh, and thin. Other things being equal, that cider will probably prove the best in which the vinous fermentation has proceeded slowly, and has not been confounded with the acetous."

The makers of fine sweet cider give the most unwearied attention to the liquor during fermentation. They apply their ears to the casks several times every day and night, to discover whether the singing noise has begun. They can distinguish accurately between this "singing," which is the sign of active fermentation, and another less audible noise called "fretting," which

is the sign of inactive fermentation. At the first symptom of singing, the clear liquor is racked off into another cask, without disturbing the dregs. Some ciders are more obstinate than others, so that while some will be effectually quieted by three or four of these rackings, others may require upwards of twenty. A cold season saves much trouble, as a longer interval then takes place between the rackings. But on some occasions the same liquor has been racked every day in succession for fifteen or sixteen days. Of course considerable waste attends this process, so that the cider is diminished perhaps one-third, or even one-half, before the fermentation has ceased. The dregs on each occasion are, however, useful for many purposes. It is said that some cider-makers are so watchful at this critical time, as to remain up every night for a period of six weeks, leaving their attendant to do duty in the day-time.

Stumming or matching the cask is a plan of checking fermentation by inserting at the bung-hole a lighted rag dipped in sulphur, and fixed to the end of a wire. A pailful of cider is left in the cask, and when the rag has burnt out, the cask is shaken that the liquor may be fully impregnated with the fumes of the sulphur. The cask is then filled up with cider, and fermentation receives a check, though perhaps only for a time. This method is apt to give the liquor an unpleasant taint. The fining of cider is performed by stirring into the liquor the shells and whites of eggs beaten up, or a quantity of isinglass. In some cases it is done by filtering the whole of the cider through very large bags of fine calico, which are suspended above the vat, and are each made to end in a point, where a small quantity of finely powdered charcoal is placed. The cider, when it begins to run, will be a little discoloured by the charcoal, and these first runnings must be returned to the bag, but afterwards the liquor will be perfectly clear and bright, and may be put in the cask, and bunged immediately. This appears to be one of the best methods





ONE of the great beauties of our island, repeatedly noticed by foreigners with admiration, is its cultivated and garden-like appearance. This is especially remarkable in the southern parts of the kingdom, where an extensive view is generally a scene of fertility and beauty, a richly wooded and well-watered tract on which the eye rests with the greatest satisfaction.

A very large proportion of this beauty is owing to the practice of enclosing our fields with living and verdant fences, and also of permitting timber trees to remain in those wild and picturesque hedges, which border green lanes or village by-ways. For although in some of our counties the stone-fence is adopted on account of the abundance of that material, yet the live fence is so much the more general, as to be one of the characteristics of our native land. And long may it remain

so; for utility, as well as beauty, is therein concerned. Stone fences are, indeed, more convenient in particular districts, and can often be had in places where hedges would scarcely grow. They require no care or pruning, are not injured by sheep or other animals, and afford no shelter for birds. But in this last respect their merit, though much extolled, is very questionable. In order to admit it, we must first be sure that the presence of birds is an evil; and this it would be difficult to prove. For it has been credibly stated that on a farm where the experiment was tried of exterminating hedgerows and trees, and thus getting rid of birds, the vast increase of the insect tribes, and their ravages in the caterpillar state, were so alarming that it was necessary to restore the old state of things as quickly as possible.

The use of fences is chiefly confined to lowlands, for among extensive ranges of hills, and in mountain districts, the pastures are wholly open, and flocks are fed under the guidance of their respective shepherds. And in a pastoral age this must have been the case almost universally, whatever might be the character of the country.

Yet hedges of thorns as well as other fences have been in use from a very remote period; as is evident from the frequent allusion made to them in the Sacred Scriptures. The word of the Lord to an idolatrous people was, "Behold, I will hedge up thy way with thorns." Hosea, ii. 6. The complaint of the prophet when lamenting the miseries of Jerusalem, was, "He hath hedged me about that I cannot get out; he hath made my chain heavy," Lament. iii. 7. In the parable of the fenced vineyard, which brought forth wild grapes, the declaration was, "I will take away the hedge thereof, and it shall be eaten up; and break down the wall thereof, and it shall be trodden down," Isaiah, v. 5. "The way of the slothful" is said to be "as an hedge of thorns." Prov. xv. 19. In an opposite sense, the man whom God protects from evil is said to be hedged

in. "Hast not thou made a hedge about him, and about his house, and about all that he hath on every side?" Job i. 10.

Among heathen writers there is also mention made of fences of different kinds, and it appears that the same plant (the hawthorn), which we now employ for hedges, was also a favourite with them. In the present day, and in our own country, the whole system of husbandry is so much altered, and live-stock is so often kept in the neighbourhood of cultivated crops, that attention to fences is no longer a matter of small importance, but is absolutely necessary to the welfare of the farmer.

The time for making and renewing live-fences is from the fall of the leaf in autumn, until March or April, and the operation is always most successfully performed on good ground that has been perfectly freed from weeds, well stirred with the plough and harrow, and long exposed to the freshening influence of the air. It should also be well manured, and sufficiently limed to prevent worms from multiplying in the soil.

There are several common plants for making hedges; but none is so well adapted for the purpose, or so much employed as the common hawthorn. The reasons for this preference are stated in few words by Withering: "On account of the stiffness of its branches, the sharpness of its thorns, its roots not spreading wide, and its capability of bearing the severest winters without injury, this plant is universally preferred for making hedges whether to clip or to grow at large."

The hawthorn (*Cratægus oxyantha*) is the *aubépine* of the French, and the *hagedorn* or hedgethorn of the Germans. Its botanical name of *cratægus* signifies *strength*, on account of the hardness and stubbornness of the wood. The plant makes a hedge so well furnished with thorns as to be quite impenetrable to cattle. The branches burn as well green as dry, and are often used in heating ovens; the tips of the young shoots are used

to adulterate tea; the bark furnishes a yellow dye, and with copperas, is used to dye black.

It is scarcely necessary to describe the appearance of this plant, since it forms the common material of hedges in the neighbourhood of towns as well as in the depths of the country, and is one of the first plants on which we perceive the tender green foliage of spring. Its white and fragrant blossoms too!—who is unacquainted with them, named as they are from the lovely month of May? The village May-pole, that relic of old times, is



MAY-BLOSSOM.

not yet quite forgotten, nor are the May-day garlands of village children yet neglected; but vainly have we looked for some years past for the true "May," or hawthorn-blossoms, on May-day. These blossoms now rarely open before the end of the month, or the commencement of June. They are succeeded by a profusion of berries called *haws* (hence the name *hawthorn*), which in autumn become of a glowing red colour, and

remain long on the branches, affording a welcome supply for the larger birds during winter.

The hawthorn must not, however, be passed over as a mere hedge-plant, for when allowed to grow to its natural size it forms a handsome bush, and in old age a picturesque and gnarled tree, very pleasing to the eye. Many examples of beautiful and aged thorns are to be found, in Bushy Park for instance, which will fully redeem the tree from such censure as is bestowed upon it by the celebrated Gilpin, who denies much picturesque beauty to the hawthorn. "Its shape," he



FRUIT OF HAWTHORN.

(Natural size.)

says, "is bad; it does not taper and point like the holly, but is rather a matted, round, heavy bush. Its fragrance, indeed, is great; but its bloom, which is the source of that fragrance, is spread on it in too much profusion; it becomes a mere white sheet, a bright spot, which is seldom found in harmony with the objects around it. In autumn, the hawthorn makes its best appearance. The glowing berries produce a rich

that which often adds great beauty to the corner of a wood, or the side of some crowded clump."

Sir Thomas Dick Lauder, in his edition of Gilpin's *Forest Scenery*, endeavours to rescue the hawthorn from this slight upon its beauty. He says, "We think Mr. Gilpin is peculiarly hard on the hawthorn. Even in a picturesque point of view, which is the point of view in which he always looks at nature, the hawthorn is not only an interesting object by itself, but produces a most interesting combination or contrast, as things may be when grouped with other trees. We have seen it, hanging over rocks with deep shadows under its foliage, or shooting from their sides in the most fantastic forms, as if to gaze at its image in the deep pool below. We have seen it contrasting its tender green, and its delicate leaves, with the brighter and deeper masses of the holly and the alder. We have seen it growing under the shelter, though not under the shade of some stately oak; embodying the idea of beauty protected by strength. Our eyes have often caught the motion of the busy mill-wheel, over which its blossoms were clustering. We have seen it growing grandly on the green of the village-school, the great object of general attraction to the young urchins, who played in idle groups about its roots; and perhaps the only thing remaining to be recognised when the school-boy returns as the man. We have seen its aged bows overshadowing one half of some peaceful woodland cottage; its foliage half concealing the window, whence the sounds of happy content and cheerful mirth came forth. We know that lively season,—

‘ When the milkmaid singeth blythe,
And the mower whets his scythe,
And every shepherd tells his tale
Under the hawthorn in the dale;’

and with these and a thousand such associations as these, we cannot but feel emotions of no ordinary nature, when we behold this beautiful tree."

Fully participating in this opinion of the hawthorn, let us notice its cultivation for purposes of utility rather than of beauty. Hawthorn-plants are easily raised from the ripe haws, or seed of the plant, but some care is required in collecting it. If a large heap of haws be allowed to lie long together, the fruit will ferment, and the vegetative powers of the seed will be destroyed. When sown, the seed does not germinate till the second spring, and when sufficiently advanced, the young seedlings must be planted out from the seed-bed and cultivated for two or three years longer, before they are fit for the purpose of a fence. They are, indeed, sometimes used at a very early age; but it is considered better to purchase from the nursery at once plants of six years old or thereabouts, and which will more speedily become useful in their new situation.

There is another and a quicker way of raising thorn-plants, which is sometimes adopted. This is by planting fragments or trimmings of the roots, which may be obtained in transplanting and renewing hedges. These, if placed in a bed of good earth, will shoot out in the following spring, and furnish the materials for a hedge in a much shorter time than by raising them from seed. Such cuttings must be buried deeply in the earth, beyond the influence of frost, or they will not succeed. The general practice of nurserymen, however, is to raise the plants from seed.

The method of planting a thorn-hedge depends entirely upon the nature of the soil: if this be high and subject to drought it may be necessary to plant the hedge below the common surface of the field, to save the plants from being entirely dried up: if, on the contrary, the soil be very wet and marshy, the hedge must be raised considerably above the common surface, by means of an embankment on the top of which it is planted; for the hawthorn never prospers on cold wet soils. Where the soil is neither too wet nor too dry, and where there is no need of the drainage afforded by a ditch,

the hedge is simply planted on the common surface of the field.



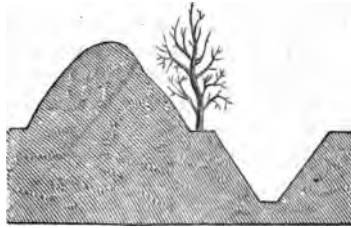
DITCHER'S
SHOVEL.

But the plan most generally approved is the union of hedge and ditch, which affords a secure fence, and at the same time carries off the superabundant moisture of the field. For this purpose a ditch is prepared, and the earth from it is thrown up to form a mound for the protection of the plants. But it must ever be remembered that cold, heavy, unprepared soil, such as might be dug up from an ordinary ditch, is not proper for these plants. No wonder that fences planted in such soil seldom prosper. It is on well-manured and well-prepared earth alone that thorn-plants should be cultivated, for these plants require quite as much nourishment to ensure their healthy growth, as would be necessary for the most important grain-crop. This was known in the time of Tusser, for he recommends ploughing and delving as the needful preparation for a hedge.

"Go plough or delve up, advised with skill,
The breadth of a ridge, and in length as you will;
Where speedy quickset for a fence you will draw,
To sow in the seed of the bramble and haw."

When the line of the fence has been properly marked out with a cord, and poles or pegs at certain distances, the digging commences. In preparing the ditch, it is necessary to keep it of not more than a spade-breadth at bottom, with the sides sloping at an angle of forty-five degrees. The earth which forms the mound on one side of the ditch is shaped and beaten with the spade, and a little ledge or *scarcement* is formed at the foot of the mound as the bed of the young plants. Some persons greatly object to this *scarcement*, and prefer planting the thorns immediately in the slope of the bank, without any protecting ledge. They think that the scarce-

ment is not only unnecessary, but greatly favours the growth of weeds. But the great advantage in this ledge



DITCH AND MOUND.

is, that it tends to prevent the earth falling down into the ditch, and thus exposing and injuring the roots.

The next thing to be observed is the treatment of the young plants. As we have already intimated, it will save time and trouble to choose thorns of six or seven years old, when the main stem will be about an inch in circumference. These will soon make valuable fences, while younger plants will need protection and nursing for two or three years. But the older the plants, the more care must be bestowed upon their removal. Instead of trimming and cutting the roots, as is the common practice, every care must be taken not to mutilate them. On this account the plants should be taken up with prongs, not with spades, and should not be suffered to lie long out of the ground. Plants of equal size should be selected for the same hedge, because, if put in promiscuously, great and small, the stronger will outgrow and destroy the weaker plants, and gaps in the hedge



THORN-PLANT PREPARED FOR PLANTING.

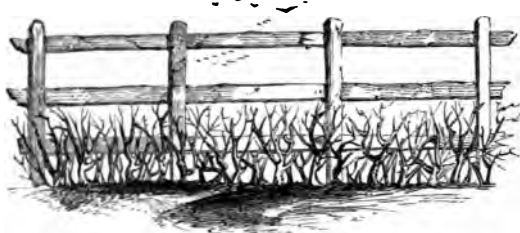
will speedily occur. The plants are all shortened down before they are set, because the roots thus have less to nourish. A single stem, which, when set, will not stand more than two or three inches above ground, is all that is necessary. This usually sends out three or four strong shoots near the earth, which have as much vigour as the original stem would have possessed, with the advantage of affording three or four stout props to the hedge instead of one. A bed being made for the roots to lie in, as much as possible in their natural position, the plants are then laid in their appointed place, and carefully covered in, the earth being well beaten down over them. By this careful management of the roots, a thorn-hedge is sure to succeed, the soil and situation having been well chosen; but when all the finer fibres are cut away, and even the principal roots greatly maimed, it is to be wondered at that the hedge ever recovers such rough treatment. It has been well observed, that, "when thorns or other hedge-plants are thus severely handled, and their roots and tops so unmercifully cut off, they resemble cuttings more than plants, and must remain a very long time in the earth before they are capable of sending out new roots, or drawing from it a quantity of nourishment adapted to their support. Were nursery-men, and others who raise these plants, to bestow the smallest attention upon the subject, common sense would dictate a very opposite treatment. Men of observation know, that in every instance where either trees or herbaceous plants are to be transplanted, the more carefully they are taken out of the ground, the more numerous and entire their roots, and the sooner they are again put into the earth, the less check will they receive, and the quicker and stronger will they afterwards grow. If these observations are just, how faulty and defective must the system we have just now described appear! Indeed nothing can be more repugnant to nature and common sense than to suppose that, when plants of any description are removed from the situation in which they are

growing, and sent to such a new establishment in a different soil, and perhaps a worse climate, they will thrive better by having their roots cut off, and being almost entirely bereft of the means of obtaining nourishment."

The planting being completed, little more will remain to be done during the first year. In the second year, after the leaves have fallen, the side branches are slightly cropped, and the plants kept wide at bottom, and narrow at the top, as represented in the figure on page 295.

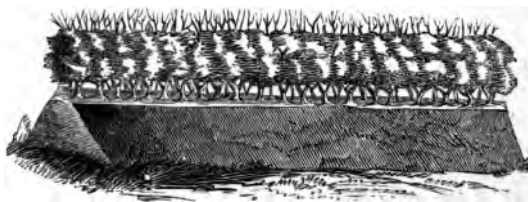
If the hedge is not to be planted on the slope of a ditch, but on the common surface of a field, the operations are more simple. A furrow is drawn along the line of the intended fence, with a common plough, about the end of November, and a labourer walks along the furrow with a bundle of thorn-plants under his arm. These he drops in handfuls of six or eight together at certain distances. When he has exhausted his bundle he returns, and lays the plants in the furrow, so as to lean against its perpendicular side, and at a distance of from four to eight inches asunder. He then covers in the earth from the other side, and setting a foot on each side of the line of plants, he walks slowly along, treading in the earth to the roots of the plants the whole way. The soil is then pointed on each side with the spade, and the work is done. A single labourer working in a good soil, will thus plant several hundred yards of thorns in the course of one day. Sometimes the furrow is laid out with the spade, instead of with the plough, and the planting performed as above. In some cases the dibble is used for planting thorns; but this is improper, because the roots receive great injury when pressed into a narrow space, or trimmed to suit the hole made by the dibble. When this kind of hedge is made to inclose a pasture field, it is necessary to protect it from the injuries of cattle. This is done by a railing placed on the side where the protection is needed: but if cattle are to be kept on both sides of the hedge, a

double railing will be required, until the plants have become strong.



HEDGE WITH POSTS AND RAILS.

It is very common in many parts of England to see a hedge raised upon an elevated bank of earth to protect it from a cold or wet soil; but the plan has these disadvantages,—that the nourishment of the hedge-plants is obtained only or chiefly from the bank on which it grows, which is scarcely sufficient to keep it vigorous; that in very severe winters, when the frost lasts long, there is danger of this bank being penetrated, and the hedge entirely destroyed; and, that the space occupied by this kind of embankment is considerable, and cannot be considered less than a waste of soil. Sometimes this



HEDGE OF COPPICE-WOOD.

sort of fence is made, not of thorn, but of coppice-wood cut short.

Some cultivators continue to plant a row of trees in the line of their fences, for the sake of sheltering, beautifying, and improving the country. That the growth of forest-trees in hedge-rows has a very pleasing effect to the eye, every one must admit; but we fear the objections against the practice are too weighty to allow of our saying a word in favour of this old custom. The pleasure afforded by their shade, and the picturesque beauty they give to a country, are not sufficient to weigh against such reasons as the following, given by a practical farmer:—

“It is quite impossible, even with the greatest care, to rear thorn-plants to become a good fence, under the



HEDGE WITH TREES.

drip of forest-trees. Thorns are very impatient of being overshadowed by taller trees; even trees planted on the top of a mound, betwixt double hedges, rob both of moisture at the roots, and direct the drip among the branches of the thorns. ‘To plant trees in the line of a hedge,’ says Lord Kames, ‘or within a few feet of it, ought to be absolutely prohibited as a pernicious practice. It is amazing that people should fall into this error, when they ought to know that there never was a good thorn-hedge with trees in it. And how should it be otherwise? An oak, a beech, or an elm grows faster than a thorn. When suffered to grow in the

midst of a thorn-hedge it spreads its roots everywhere, and robs the thorns of their nourishment. Nor is this all: the tree, overshadowing the thorns, keeps the sun and air from them. At the same time, no tree takes worse with being overshadowed than a thorn.' Hedge-row trees are strongly recommended by all the old writers on agriculture, as being the best means of growing timber for the navy, and giving shelter to fields; and even a recent writer on timber seems to favour the plan of planting the oak in hedge-rows, as if that tree could not be sufficiently gnarled for naval purposes, and rendered thick in the bark for the purposes of tanning, in other exposed situations than in thorn-hedges, where they could do no injury. Hedge-trees at a distance, no doubt, give a closely fenced appearance to a country, which then looks not unlike an extensive orchard; but they are at best formal, ill-shaped, generally stunted, and often twisted, on account of being acted on by the winds, and are injurious to roads and crops near them, though they may yield tough timber. The oak suffers in hedge-rows in all these respects, as well as less valuable wood. It may seem ungracious treatment, after trees have grown some years amongst hedges, to root them out; but they deserve no better fate, because they are intruders, and have truly been designated *the landlords' thieves*. If intended for shelter, plantations and clumps are much better adapted for the purpose than single trees, and form far finer objects in the landscape than rows of stunted trees. If thorns are made to fence plantations, they should be planted on the outside of the mound, though facing the north, that the air may have free access to them; and no large forest-tree should be planted near the thorn-hedge which fences the plantation, for, independent of overshadowing, thorns dislike being mixed with other plants. It is not unusual to see beech mixed with thorn as a hedge; but beech, anywhere, is no terror to live stock in fields, and should never enter into a fence on a farm, however

appropriate a beech-hedge may be near shrubberies. The sweet-briar, too, is frequently mixed with the thorn, and no doubt imparts a delightful perfume to the air after a shower in summer, but it soon kills the thorns in its vicinity. The crab-apple also overcomes thorns in hedges. Indeed, we have only to view the hedges in the south of England, to be convinced of the noxious effects of intermixing other plants with the thorn."

In high and exposed situations the screen-fence is strikingly useful. This is a belt of trees planted chiefly for the purpose of shelter, and therefore formed of such trees as will grow best on the particular soil, and protect best at all seasons the crops or the live-stock they



SCREEN-FENCE.

may be designed for. In low grounds this sort of fence is not only unnecessary, but actually mischievous; while on high lands it might be much more extensively used to the advantage of the farmer. There are wide tracts of land, much exposed to the violence of the wind, which would be very much improved by the shelter thus afforded. Screen-fences are very commonly made of spruce-fir intermingled with larch; but the latter is not fit to be used alone, because it loses its leaves in winter. Where a large proportion of the fence consists of larch, a close belt of spruce should be planted outside and kept low and bushy. Where the soil will admit of it, screen-fences may be made of other

trees, such as beech or oak ; an intermixture of various trees may be also made, and has a pleasing effect.

In low and marshy places where the hawthorn cannot be planted with success, very tolerable fences are made of alder and willow, which grow rapidly in such situations ; and from the pliant nature of their branches can be easily twisted and interlaced. In drier ground the furze or gorse may be cultivated, and will make an excellent hedge for a time ; but it is not durable, being very apt to be destroyed by frost. Careful pruning is said, however, to prolong its existence to a considerable extent.

In northern Germany the hornbeam is used as a field fence, and with very good effect, according to one of our writers on husbandry. "No fence of a solid permanent kind pleases me so much as the hornbeam-hedges of Westphalia and other parts of North Germany. When the German husbandman erects a fence of this nature, he throws up a parapet of earth with a ditch on each side, and plants his hornbeam-sets, raised from layers, in such a manner that every two plants may be brought to intersect each other in the form of a St. Andrew's cross. In the part where the two plants cross each other, he gently scrapes off the bark and binds them with straw thwart-wise. Here the two plants consolidate into a sort of indissoluble knot, and push from thence horizontal slanting roots, which form a sort of living palisado, or *cheveaux-de-frise* ; so that such a protection may be called a rural fortification. These hedges being pruned annually, and with discretion, will in a few years render the fence impenetrable in every part. It is not uncommon in Germany to see the sides of high roads thus guarded for ten miles together."*

Common holly makes a beautiful and formidable fence, and would be one of the most desirable could it be easily cultivated. But it is exceedingly slow of growth, and difficult to raise. It does not bear trans-

* HARTZ.

planting well, and must, therefore, be raised from seed in the spot it is intended to occupy. Were it not for these obstacles it would doubtless be a very favourite and general plant for hedges, on account of its beautiful rich green (which does not suffer but rather appears to greater advantage in severe weather), and its sharp and bristling foliage, which is quite impenetrable to cattle, and may be pruned and cropped without injury to the tree.

The plants named are the principal used in making live-hedges; but before we speak of the general treatment of a growing fence, it will be as well to notice some other kinds of fence in common use. In some places an open ditch, made wide and deep, is the only protection to a field. This is useful as a water-course, but is only to be recommended in low wet situations. A *ha-ha*, or sunk fence, is often used in pleasure grounds, being a dry ditch, one side of which is nearly perpendicular, and faced with brick or stone. A simple earthen mound serves the purpose of a fence in some parts of Wales. Slabs of stone set edgeways are common in Gloucestershire. Hurdles are well known as a convenient moveable fence. Netting is not uncommon for the purposes of enclosure; but it has the inconvenience of being easily torn by cattle. It is therefore chiefly adapted for shrubberies and pleasure-grounds, where a slight and almost invisible fence of iron is likewise used.

Stone walls, which are the common fence in some parts of the country, are made of stones without mortar, or with it as it may happen, but more commonly the former. Dry stone walls are made of sand-stone or whin-stone, and are constructed by the help of a framework of wood. Two upright posts are fixed together so as to correspond with a vertical section of the wall. When the ground is cleared for the foundation, the line of fence is marked out, and pegs or pins are set *along the centre*; the workman then carries his wooden

frame some distance along the line to be built upon, and sets it upright by means of a plumb-line attached to it. By the aid of an inclined piece of wood and a



FORMATION OF A DRY STONE-WALL.

stone he keeps it in this position, and then proceeds to set up another similar frame at the place where the wall is to commence. Cords are then stretched between the two frames, on the outside, corresponding to the intended outer surface of the wall: these serve as a guide to the workmen in building it. When a part of the wall is finished, one of the frames is laid aside as no longer necessary, and the cords are afterwards fastened to both sides of the wall and then attached to the frame in advance, which continues to be the guide as to the height and dimensions of the wall.

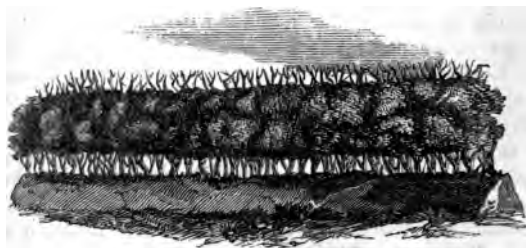
The foundation of a dry stone-fence should always be laid on solid ground, and if there is no green sward to build on, the loose earth may be removed with a spade and the wall built on the more compact soil underneath. The largest and flattest stones are laid at the bottom, and if there are some of sufficient size to stretch across the breadth of the wall, these may be inserted at intervals and will make it more secure. The tools used in making such a wall are the spade, pickaxe, and mason's hammer: with these the ground is prepared, and the stones are fitted and beaten in. At the top of the wall a coping is formed either of turf-sods, or of large stones closely built and cemented with mortar.

In some cases the fences above described are by no means displeasing to the eye, for instance, in the West Riding of Yorkshire, where the stone of which they are formed is of a fine iron-brown, contrasting well with the rich tints of the foliage of trees, and with the livelier colours of creeping plants, which in many places form a graceful and natural drapery for the wall. The rough and almost ruinous appearance of these fences also favours their picturesque effect. When seen at intervals between the trees, as they follow the undulations of the Yorkshire hills, they might almost be mistaken for the remains of ancient fortifications, especially when the harshness of their outlines is lost in the grey mists which so frequently invest those beautiful landscapes.

The ordinary dimensions of a dry stone-fence are thirty-two inches in width at the bottom, sixteen inches at the top, and four feet and a half in height including the coping. It is very desirable, both for beauty and strength, to plant ivy near these walls; for unless built by experienced hands, they cannot be so secure as if cement were employed.

A variation from the common dry stone-fence is the Galloway dike, so called from having been first used in Galloway. This is principally useful for enclosing and sheltering high grounds where sheep are pastured. It is built in the regular manner with dry stones to the height of about two feet, being very broad at the base and tapering upwards. It is then levelled with a course of flat stones projecting two or three inches over the wall on both sides. The wall is then continued two or three feet higher with a sort of open-work of rugged stones, placed upon each other in positions that keep them from falling, and yet having considerable vacancies between them, allowing a free passage for light and air. The wind whistles through these openings with great force, and this, together with the tottering appearance of the fence, seems to be quite effectual in preventing sheep and cattle from approaching it.

Let us now return to the live-fence, with which, in the southern counties, we are most familiar. In the first season after planting, little need be done to a live hedge, and in after years a little attention to weeding, and very simple management will preserve a fence in vigour. There are different opinions as to the pruning of hedges; but many practical men recommend that the top of the hedge be scarcely touched for some years. It is true, that by cutting off the tops every year a great quantity of small brushwood is formed in the hedge, but there is no growth of substantial branches. For when the operation is continually repeated, the hedge becomes so extremely subdivided that it is a mere brush of small twigs, without any strong shoots to give it support. Such a hedge bends and yields so much to any pressure against it, that half its value as a fence is lost. The better plan seems to be, to allow the main stems to grow up to the intended height, and to acquire their full size before they are touched by the pruning-knife, the side branches only being kept short. Having reached the desired height, the hedge may then be safely trimmed and kept in shape, and will soon present a thick brush of wood on the outside, covering a strong and substantial growth within. A hedge of this kind is as solid as



NEWLY-TRIMMED HEDGE.

a wall, and when the tops have been newly-trimmed and deprived of their foliage, it has somewhat the above ap-

pearance. It should be remembered, in pruning a hedge, that the shape tending towards a pyramid is more durable than the broad flat top sometimes given to hedges.

When at last the hedge becomes aged, and begins to grow thin at the roots, and to show feebleness of growth, it must be cut down to within a few inches of the ground, and the ditch and mound made up as at first. But if the hedge had been originally planted on the common surface of the field, then some protection will be required for the lopped hedge, until it has sent out a strong growth of new wood. But it is not necessary to go to the expense of paling, because the thorns cut down furnish themselves material for a good temporary fence. This is called a dead-hedge and is thus formed. The workman cuts the principal stems into lengths of three or four feet, and makes them up in bundles, mixing with them the smaller twigs and brushwood. These bundles are laid closely along the line of hedge, and each bundle covered with a sod, or a spadeful of earth, and firmly trodden down in its place.



DEAD-HEDGE.

During the growth of the shoots in the live-hedge, as well as at every other period in the existence of the fence, weeds should be carefully cleared away, not only because their growth deprives the hedge of nourishment, but because they do a great injury to the neighbouring field. However careful the farmer may be in keeping his fields clear of weeds, yet if he suffers them to exist in the hedge-rows, and to perfect their seed, his labour will have been all in vain. Thousands of winged-seeds of thistle, dandelion, groundsel, &c., will be wafted all over the land, and defy the efforts of the weeder. In this respect a farmer often suffers from the slothfulness of his neighbours, and has the mortification of seeing his clean fallows injured by the wind blowing the seeds across them, from the neglected fences of an adjacent

farm. Were every farmer simply to cut down the weeds all round his fences before they run to seed, this annoyance would be spared to himself and his neighbours.

The plan of cutting down old and overgrown hedges to the roots answers very well when there are no considerable gaps to be filled, or dead thorns to be removed; but when there is a deficiency of plants, or a considerable decay of the hedge, a better way is to cut down one-fourth of the whole quantity to the height intended for the fence, and to bend down and warp the remaining three-fourths of the upright stems, twisting them in amongst the rest, and thus supplying the gaps. This is called *plashing* the hedge.

In the county of Hertford, where coppice-wood is frequently used in hedges, the method of plashing is as follows:—The hedgers first begin to clear the old hedge of all the dead wood, brambles, and other irregular growing rubbish, leaving all along the top of the bank the straightest and best growing stems of the thorn, hazel, elm, ash, oak, willow, and beech, as well as other kinds to the number of about five or six in the yard. But where there are any gaps or places that are thin of live wood, more are left on each side of them. This being done, they have recourse to the repairing of the ditches, the whole of the earthy material from which is laid upon the banks with great care; the overlooker being attentive to the matter. When the ditches have been thus finished the men return to the hedges. A portion of the stems of the plants left in clearing the old hedges are cut off at the height of three feet from the top of the bank, being reserved for hedge-stakes to the hedge which is to be raised. This is an excellent practice, as such stakes, from their being immovable and incapable of rotting, keep up the new hedge in such a manner that it never falls or leans in any direction. Dead hedge-stakes are in the next place driven firmly into the bank, where they are wanted; willows or wil-

lows being mostly chosen in order that they may take root and grow. The remainder of the live wood which had been left standing is then plashed down by the hedgers. In executing this part of the work they make two upward cuts in each of the stems, one stroke being given near the ground, and the other at the distance of eight, ten, or twelve inches above it, but only just deep enough to slit out a part of the wood between the two cuts, leaving the stem supported by a little more than the bark, or about a fourth part of its first size. It is then laid down along the top of the bank, and interwoven with the hedge-stakes. All the plants are served in the same way, and where they are not sufficient to fill up and complete the hedge, dead wood is had recourse to; but this should be avoided as much as possible, from its injuring the living plants in its decay. The work is completed by running an eddering along the top of the fence, which is likewise sometimes practised in making dead-hedges.

Such are the principal features of the management of fences; and as good farming has become so much more general than formerly, so also good fences are much more frequently seen. Yet the fences throughout England are, for the most part, highly objectionable, simply on account of their size. "There is a vast length and breadth of land occupied and overshadowed by them, which might be bearing corn and pasturing cattle; and, though it may appear somewhat startling, the truth is, that were such as are unnecessary cleared away, and new and proper ones substituted for the remainder, an accession of grain-bearing land would be available, equal in extent to one of our large counties. As is proved by actual survey, the average width of the fences throughout Norfolk is ten feet, which is about seven feet more than is actually necessary." The low country in most parts of the kingdom is sufficiently, if not too thickly fenced, but the upland districts are still deficient in *shelter*.

"The evils of numerous hedge-rows, especially if they are high, are never more apparent than during the latter part of the summer, when heavy rains are sometimes experienced, with intervals of wind and sunshine, sufficient to dry the crops when they are exposed on all sides, but which, from their being surrounded with high fences, are thus allowed to lie damp and wet for several days, a prey to mildew and every kindred disease. The best sample of wheat is not found at the hedge-side, but in those parts of the field where there is an unchecked circulation of air; and the greatest weight of turnips, within a given space, is also found wherever there is a free play of the elements. . . . It must also be borne in mind that the number of fences seriously affects the amount of labour on a farm. The most obvious evil is the frequent turnings they occasion to the ploughman, and the time expended in cultivating the land, difficult of access, in their immediate neighbourhood. As a matter of course, it follows that to every enclosure there must be an entrance, and at most of the entrances a gate, an item of expense which, when taken separately, appears to be but trifling, but which in the aggregate amounts to a considerable sum; for all these gates have to be repaired and ultimately replaced."*

Wide and numerous hedge-rows are bad, on account of the great exhaling surface they present, assisting in the formation of the cold and vaporous atmosphere experienced throughout England. In spring-time, according to Mr. Grigor, the leaf of the common elm sends off vapour at the rate of three grains daily; that of the beech, two grains; an oak, two and a half grains; a hawthorn, which is a very small leaf, one grain; a sprig of Scotch pine, scarcely anything; and a sprig of holly, yew, and larch, about a third of a grain each. It is evident, therefore, that, where practicable, the holly

* Grigor's Prize Essay on Fences, in the Transactions of the Royal Agricultural Society of England.

should be used in preference to the hawthorn, as sending off little or no evaporation.

Of the existing fences very many are allowed to outgrow their strength, and become heavy at the head and thin at the roots; or they are full of gaps, rudely stopped up with stones or pieces of wood, to the certain destruction of the plants on either side; or they are so injudiciously pruned as to be weakly in their growth. Such neglect is scarcely to be excused, because the business of hedging and ditching is carried on during winter, when labour is comparatively scarce, and when the farmer can hardly find employment for all the people he is expected to support.

In conclusion, let us say a few words in recommendation of the holly. Its fitness for a fence, by reason of its beauty, strength, and prickly foliage, has been already noticed; but the slowness of its growth, and the expense of keeping it protected while it is rising to the proper height, have likewise been quoted, as the reasons why we so seldom see it employed. These may indeed be reasons why the holly should not become general as a common farm-fence; but they are not sufficient reasons why the plant should be so little cultivated in parks and pleasure grounds, where it would certainly form an exceedingly beautiful addition, whether as a fence or as a separate tree. Yet even as a farm fence it need not be despaired of. "For home districts," says Mr. Grigor, "and especially for grazing grounds, no tree presents so many qualifications for a hedge as the holly. Being a close-growing shrub, and an evergreen, it forms a most desirable shelter for cattle pasturing in fields surrounded by it; and, as it grows much better than the hawthorn under hedge-row trees, (which are absolutely necessary around grazing lands,) it ought, in every case, to be adopted in enclosing meadows and pastures not overcharged with moisture. It is, besides, a much more beautiful object than the hawthorn, and being recommended near to dwellings, it is important to remember

that it does not exhale any perceptible vapour. Added to these, are the following important considerations:—first, its keeping itself almost free from weeds; for from the closeness of its branches at bottom, it excludes the air so effectually, that none can grow. Secondly, its not being liable to the attacks of any insects; and, thirdly, its not being resorted to by birds.”

Sand and sandy loam are the soils best suited to holly, but it will flourish in almost any situation where the land is not absolutely saturated with wet. The ground should be trenched and manured as for any other fence, and the plants may be set on the common surface of the field, with a fence on each side. A damp and cloudy day should be chosen for the removal of the plants, any time between November and March. Plants of six or ten years of age, and, if possible, such as have been transplanted the previous year, and have thus sent out numerous fibrous roots, should be chosen. They require no pruning either at root or top, and they will be more certain to prosper if taken up with large balls of earth round the roots. They may then be set in a trench, at least a foot apart, the earth returned, and the plants gently trodden in. For two years the hedge will need no pruning; in the third year, the sides will have become broad and irregular, and must then be clipped with the shears, not trimmed with the hedge-bill or hook, the stems being too thick, and the leaves too numerous to admit of the latter process without injury. The poet Southey was a great admirer of this tree, and wrote in its honour the following lines, dwelling particularly on the fact, that the lower leaves of the holly are strongly armed with prickles, while the upper ones are quite free from them.

“O Reader! hast thou ever stood to see
The Holly-tree?
The eye that contemplates it well perceives
Its glossy leaves
Ordered by an intelligence so wise
As might confound the atheist's sophistries.

"Below a circling fence its leaves are seen,
 Wrinkled and keen;
No grazing cattle through their prickly round
 Can reach to wound;
But as they grow where nothing is to fear,
Smooth and unarmed, the pointless leaves appear.

"I love to view these things with curious eyes,
 And moralize:
And in this wisdom of the holly-tree
 Can emblems see,
Wherewith, perchance, to make a pleasant rhyme,
One which may profit in the after-time.

"Thus, though abroad perchance I might appear
 Harsh and austere,
To those who on my leisure would intrude
 Reserv'd and rude;
Gentle at home, amid my friends I'd be,
Like the high leaves upon the holly-tree.

"And should my youth, as youth is apt, I know,
 Some harshness show,
All vain asperities I day by day
 Would wear away,
Till the smooth temper of my age should be
Like the high leaves upon the holly-tree.

"And as when all the summer trees are seen
 So bright and green,
The holly-leaves their fadeless hues display
 Less bright than they;
But when the bare and wintry woods we see,
What then so cheerful as the holly-tree?

"So serious should my youth appear among
 The thoughtless throng;
So would I seem amid the young and gay
 More grave than they;
That in my age as cheerful I might be
As the green winter of the holly-tree."





~~~~~

**WATER** is no less necessary to vegetable than to animal life. This beautiful and wonderful fluid, so familiar that we forget to admire it, and so universally bestowed that we fail to be duly thankful for it, is one of the great blessings of existence, covering our fields with verdure, and our tables with plenty, and producing all that is pleasing and picturesque in nature. According to the greater or less abundance of water, a country becomes fruitful or barren: according to the nearness or distance of considerable streams, towns and cities rise to importance, or fall into comparative insignificance.

Water being the great means of life and nourishment to plants, it follows that a regular supply is necessary to



secure their subsistence. The rains that occur at particular seasons and, in some countries, at distant intervals are not sufficient to support vegetable life, and some districts would therefore become desolate if it were not for the industry of the inhabitants in watering the land by artificial means.

If the importance and value attached to supplies of water in Eastern countries, there is abundant evidence in Scripture: some of the richest promises being conveyed under the simile of dew, showers, and springs. Thus when great spiritual blessings are promised, it is said, "Thou shalt be like a watered garden, and like a spring of water, whose waters fail not," Isa. lviii. 11. And again, "For I will pour water upon him that is thirsty, and floods upon the dry ground: I will pour my spirit upon thy seed, and my blessing upon thine offspring. And they shall spring up as among the grass, as willows by the water-courses," Isa. xlv. 3, 4. In the universal gladness of Christ's kingdom, one cause of joy is thus typified: "For in the wilderness shall waters break out, and streams in the desert. And the parched ground shall become a pool, and the thirsty land springs of water: in the habitation of dragons, where each lay, shall be grass, with reeds and rushes," Isa. xlv. 1, 2.

We might fill many pages with similar passages, showing that water-springs, rains, and dew, were the most esteemed among earthly gifts, and therefore the most appropriate to be the figures of spiritual blessings.

Early in the history of the world, men had learned to supply by artificial means the lack of natural moisture. The art of irrigation appears to have been known to the earliest husbandmen. In passages of Scripture such as "Blessed are ye that sow beside all waters; that send forth thither the feet of the ox and the ass," Isa. xxxii. 20; and also the following, "Cast thy bread upon the waters; for thou shalt find it after many days," allusion is doubtless made to the practice com-

mon for ages in eastern countries of flooding their grounds with water previously to sowing their most precious crops. How these husbandmen first became acquainted with the art of irrigation we are not told, but there is much reason in the supposition that the annual overflowing of the river Nile, and the benefits derived to Egypt by that means, first suggested the idea of artificial irrigation to the Egyptians, and that other nations borrowed from them the fruits of their experience. However this may be, the Egyptians themselves practised the art on a scale of such surpassing magnitude, that their canals and vast artificial lakes have been deemed "more praiseworthy monuments of their genius, than all the temples and cemeteries with which they have covered their country." Various hydraulic machines were in ancient use, some of which appear to have resembled the water wheels of the fens-districts of England, and to have been worked by the feet of men, after the manner of the tread-mill. Doubtless this laborious method of watering the ground was common in Egypt during the sojourn of the children of Israel in that land, for Moses drew the following remarkable contrast between the climate and customs of Egypt, where rain seldom falls, and the more genial climate of the promised land. "For the land whither thou goest in to possess it, is not as the land of Egypt, from whence ye came out, where thou sowest thy seed, and *waterest it with thy foot*, as a garden of herbs; but the land whither ye go to possess it, is a land of hills and valleys, and drinketh water of the rain of heaven," Deut. xi. 10, 11.

The method of raising and distributing water in Egypt at the present time, demands a great amount of labour. Water from the Nile is collected at certain times in large cisterns on the banks of the river. For this purpose the screw of Archimedes was formerly used, but now leathern buckets, or Persian wheels, are employed. The latter machines are placed all along

the banks of the Nile, from the sea to the cataracts, their situation being higher, and consequently the difficulty of raising the water being greater, in the upper portions of the stream. When the grain-crops, or the saffron, melons, sugar-canes, &c., need refreshment, a plug is taken out from the bottom of the cistern, and the water which gushes out is guided from one rill to another by persons whose office it is to manage the flooding of the ground.

Sometimes the water is merely raised by wicker baskets, lined with leather. Each basket is managed by two men, and is held by cords between them. Lowering and filling the basket at the river, they swing it over the banks into the canal, which conveys it at once to the land requiring water.

In Bengal the fields are diligently watered, or they would yield little produce. Wells are dug in the highest parts, and by means of bullocks, and a rope over a pulley, water is raised in buckets, and carried in small channels to every part of the field. Without this diligent watering of the soil in hot countries, rice, which furnishes food to the greater part of the human race, could not be cultivated. Accordingly, over the vast region of Southern Africa, the irrigation of the land by means of rivers, brooks, lakes, and wells, is a labour essential to human life. A machine similar to the Persian wheel is used in China for raising water.

In Southern Europe, also, irrigation is extensively carried on. In Italy, especially on the banks of the Po, it was practised long before the time of Virgil, and is zealously continued to this day. The waters of all the chief rivers of Northern Italy, as well as of numerous minor streams, are thus employed. From Venice to Turin, the entire country is said to be one great water-meadow, for the watering is by no means confined to grass-lands, but is conveyed into the hollows between the ridges in corn-lands, is distributed over the low-lands, where rice is cultivated, and is carried round the

roots of vines. It was from Italy that the practice gradually spread throughout the South of France, and from thence to Spain and Britain.

The conducting of water from rivers and canals, and measuring it out in certain quantities, is consequently an important business of Southern Europe, and also forms a nice part of the science of engineering. In Lombardy, the water of all the rivers belongs to the State. In the Venetian territories the government not only claims the rivers, but also the smallest springs, and even collections of rain-water. In renting the water of rivers from government, contracts are made to pay so much for the use of the water for an hour or half hour at a time, or for so many days at certain periods of the year. A person desiring to irrigate his lands has the right of making a canal through another estate, which may lie between him and the river, being bound, however, to pay the owner the value of the land, and to avoid bringing the canal close by the mansion, or through the garden of the proprietor. The rent of land having the means of irrigation, is one-third higher in Northern Italy, than that of lands not so provided. As may be supposed, the utmost care is bestowed in economizing the precious fluid.

But the irrigation practised in warm countries is very different from that of the English watered meadow. The main object of eastern irrigation seems to be merely to convey sufficient water for the growth and nourishment of the crop, the quantity varying with the different plants cultivated. Sometimes, as in the case of rice, the ground is saturated for months in succession; in others it is merely watered at intervals during the season of greatest drought. The flooding of the soil, and allowing water to remain stagnant upon it, must cause whatever matters the water may contain to be deposited upon the land, and must also afford protection to the soil from excessive heat; but these are not the objects to be answered in this country, where a superior,

and, for this climate, a far more desirable method is adopted.

The art of forming water-meadows has now attained a high degree of perfection. It is probable that the good effects of running streams instead of stagnant water, became gradually known in the course of long experience; yet the reasons why irrigation is so beneficial are even at the present day imperfectly understood. It is not merely for the supply of deficient moisture that it is desirable, since the water is conveyed over the surface of the land at a time when it would not seem to be needed, namely, during the winter months, when there is generally an excess of moisture. And it is not for the sake of the deposit with which it is charged, for, instead of being allowed to rest stagnant on the soil, and deposit its sediment, it is maintained in a constant flow over the surface. For this latter purpose, there are especial contrivances in the formation of a water-meadow, as will presently be explained.

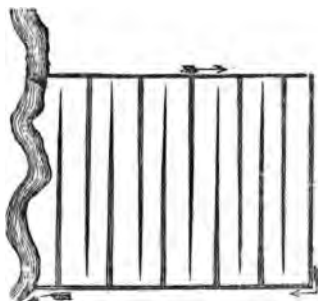
It must not be supposed that water-meadows, valuable as they are, can be made with advantage in any low situation. There are several considerations to be attended to before such meadows are formed; namely, whether the supply of water within reach will be sufficient to keep the meadow thoroughly watered during a dry season, and whether such a supply can be taken freely without trenching on the right or convenience of any other person. Also whether the water can be spared from other important uses on the farm without injury to cattle, or to machinery that may be worked by water. These and similar queries being satisfactorily answered, the meadows may then be laid out.

Water-meadows are for the most part laid out on the banks of rivers, and are best when they form a gently inclined plane. At the highest part of the meadow, a capacious channel is formed with sloping sides: the earth from it being wheeled away to fill up hollows in any other part of the field. This channel

is called the *main conductor*, as it is that which first receives the water of the river, and from whence it is conducted all over the meadow. At right angles with this main conductor are various smaller channels, or feeders, into which the water flows. These are a foot or more in width, and about four or five inches deep where they issue from the main conductor, gradually lessening afterwards. In order to turn the water into these channels, a wear, or dam, is built across the river, and the water is introduced at the highest part.

The channels yet described only provide for bringing the water in the meadow, but there is also a series of channels made for the opposite purpose of carrying the water off, and thus a constant flow is kept up, and no stagnant water remains. Thus, between the feeders there are drains at regular intervals, small at their commencement, and gradually enlarging until they join the main drain, which is a large channel corresponding to the main conductor, and conveying the water back again to the river.

Now, the management of the water, and the keeping up a regular flow over the surface of the meadow, should be the business of some experienced person. To keep the water at the necessary level, it is in-



COMMON FORM OF WATER-MEADOW.

interrupted in its course by what are termed *stops*, placed in the feeders. These are either small wooden hatches, or else mefely pieces of turf fastened down with wooden pins. The feeders are formed on the top of low ridges; the drains in the hollow; and this arrangement further aids in keeping up the flow of water.

Frequently the water which has irrigated one meadow is not returned to the river at once, but is conveyed to other meadows on a lower level. When this is the case, the main drain of one field serves as a main



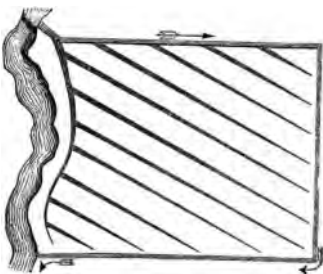
SECTION OF A RIDGE WITH FEEDER AND TWO DRAINS.

conductor to the next, and the water is conveyed from it by means of feeders all over the surface of the lower meadow, whence it is again collected by drains, and perhaps goes to irrigate a third meadow. This is an economical use of the water, and the benefits appear to be quite as great to the lowest as to the highest meadow of the system. Although a certain amount of deposit will no doubt occur, and be highly beneficial to the soil, yet the mere watering, even where there is scarcely any perceptible deposit, is of great use, and its results are most satisfactory.

The form of water-meadow above described is considered the best, as well as the simplest; but in some cases the surface of the field slopes so much that another plan is adopted. The feeders, instead of being at right angles with the main conductor, are carried across the line of descent, so that as they are severally filled, they overflow the lower side of the banks, and are not discharged into drains, but into the next feeder lower down. This sort of arrangement is called *catch-work*, and is sometimes combined with the former method when there are inequalities of surface. In either case substantial sluices are necessary to keep the water out of the meadow when it is not wanted, and also to allow one part of the meadow to be watered, if necessary, while the other is left dry.

In the first formation of a water-meadow, if the land has been in permanent pasture, the turf should be taken off, and laid aside for use, while the soil beneath

is ploughed and wrought with the spade, after which the turf may be replaced, and beaten smooth with the back of the spade. Such a meadow will be ready to take on the water at once, whereas a meadow sown with grass seed could not be freely watered for two or three years.



CATCH-WORK.

The flooding of water-meadows begins as soon as possible after the last crop of hay is removed, and generally takes place about the month of October. The water is kept in circulation over the meadows for two or three weeks at a time, and is then let off, and the ground made perfectly dry for five or six days. This alternate flooding and drying is carried on through the months of November, December, and January, care being taken to let off the water as soon as it begins to freeze. Very early in the spring the grasses begin to shoot forth, and a brighter tinge of green enlivens the meadows. The periods of watering are then very much shortened, not lasting more than a few days at a time. By the middle of March most of the meadows in southern counties are fit for the reception of live stock, and the watering is, therefore, discontinued; but in the north it is often carried on during the whole month of May. Flooding the land during summer produces rich and rapid vegetation, but such as is quite unfit for sheep, being more liable than any other food to produce the fatal disease, the "rot."

From the above details, it may seem that the construction of a water-meadow is a very simple affair; but this is not really the case; there are numerous intricacies in the subject which cannot be here describ-



ed, and there is considerable knowledge and skill required in the manager of such meadows. As it has been remarked, "It is not an easy task to give an irrigated surface the equal slope required for the overflow of water. It is very necessary for the irrigator to have a just idea of levels; a knowledge of superficial forms will not be sufficient. Few people, unacquainted with the art of irrigation, and the regulation of form which the adjustment of water requires, have any idea of the expense of modelling the surface of a field."

This art is understood and practised to a wide extent in England, and the herbage here produced is more varied, close, and fine, than in any southern country, while it is more rich and vigorous than in the countries lying farther north. Our climate, the number of our rivers, and the fertile districts through which they flow, cause the hay and herbage to be of superior quality. Many of the streams used in irrigation are so rich in animal and vegetable substances, that they manure the land as well as water it. There is a species of irrigation where liquid manure is applied to the land, in the same way, and instead of water, being distributed and carried off in the same manner. Attention to this kind of irrigation is increasing, and will greatly promote the productiveness of the land.

Another kind of irrigation is that called *warping*. Muddy water is brought into a field, and is allowed to remain until it has deposited its sediment, when it is let through the sluices. The turbid water at the mouths of rivers, where the tides and the fresh water meet, is well adapted for this purpose, where circumstances are favourable. Such is the case on the estuary of the Humber, where the water is carried several miles inland, and will deposit in the course of a single season about a foot of the richest soil.

The useful effects of irrigation decrease as we go northward. The rivers themselves are less favourable, and flow through a less cultivated country. Their banks are

frequently very steep, and thus oppose formidable obstacles to the use of the water. Yet irrigation is rather increasing than diminishing in Scotland; there are spots where, to use the words of one of their own poets—

“——a free and porous soil  
Upon a gravelly bed, at all times drinks,  
Yet ne'er is quenched. Who owns a soil like this,  
If through his fields a little mountain stream,  
Not sunk in channel deep, but murmuring down  
’Tween gently sloping banks, a mine of wealth  
Possesses in that stream.”

It may seem contradictory to state that, notwithstanding the great advantages derived from irrigation, no land will really prosper that is not kept dry, rich, and clean. But what is here meant by dry, is in a healthy condition to receive moisture. There must be no stagnant water underneath the surface, making the land cold and unhealthy; but the soil, even that which is most abundantly irrigated, must be capable of quick and healthy drying between the floodings; that is, the drainage, as well as the irrigation, must be well attended to; indeed, the drainage of the subsoil is frequently considered a necessary preparation for the flooding of the surface, the great object being to prevent stagnation, and keep up a healthy circulation of the fluid.

In former days draining was confined to land that had become seriously wet and marshy; but it is now practised on soils which, to an inexperienced eye, would seem perfectly dry. It sometimes happens that there are deficient crops on particular fields, without any apparent reason. Good farming is bestowed on them in vain, for however well managed, the crops become sickly in colour, and are evidently retarded in their progress. The farmer soon detects the real cause of the mischief, which is a superfluity of water beneath the soil. There are several signs by which he is convinced that this is the case; for instance, while useful plants decay, others spring up which he knows to be peculiar to wet soils.

such as rushes and flags. Or if these tokens do not appear, the soil itself will betray the nature of its malady. The ploughed land in early spring will show, even in the driest weather, patches or stripes of dark-coloured earth, while all the rest is of a light brown colour. And although, if dry weather lasts for several weeks, these patches may entirely disappear, there is not the less necessity for adopting some means of getting rid of the lurking evil. It is on account of stagnant water remaining in the soil all the winter, that the summer crops are injured, for the heat which is required to nourish the crops, is employed in evaporating superfluous moisture. These signs of wetness are more evident in arable land than in pasture; but, generally speaking, the presence of rushes, and the coarseness of the grass, will bespeak attention to the subject of drainage.

The ancients were not ignorant of the benefits of draining their land. In eastern countries, from the very nature of the climate, irrigation has been practised, rather than draining: but the Romans were very diligent in this art. Among their earliest agricultural writings are found particular directions for making open and covered drains, stating the necessary size and shape. The draining of springs, and the taking away of surface water were both taught. For the former the drain was left open at both ends, and the water from the spring was carried entirely out of the field; for the latter they had open ditches in stiff soils, and these they were careful to keep clear, and in good order. When the autumn rains came, all the servants were sent out with proper iron tools, to open the drains, turn the water into its proper channels, and take care that it flowed away from the corn-fields.

We have no distinct mention of draining in this country before the time of William the Conqueror, although it may have been practised at a much earlier period. In that reign it is recorded that the king's chamberlain, the Lord of Brunne and Deeping, drained a great extent

of country, and embanked the river Wielland, which used to overflow the neighbouring country every year. In the reign of Henry VIII. minute directions were given for the art of draining, in "The Book of Husbandrie," which was published at that period.

It was in the latter part of the last century that the whole art of draining underwent a complete revolution, in consequence of the discoveries and practice of an eminent drainer, named Elkington. This person was a farmer at Princethorpe, in Warwickshire, and had received very few advantages in the way of education, so that when he wished to make his system public, he was obliged to employ others to explain for him those processes with which he had a thorough practical acquaintance. It is remarkable that, although he was unacquainted with science, yet the principles on which he proceeded were at once simple and strictly scientific.

It is said, that the first idea of Elkington's method was accidentally suggested to him by the following circumstance. His fields being very wet, and many of his sheep being affected with the rot, he dug a trench four or five feet deep, with a view of discovering the cause of the wetness. At this moment a servant happened to pass with an iron crow-bar for fixing sheep hurdles in the ground. Having a suspicion that the drain was not deep enough, and wishing to know what lay beneath, Elkington took the crow-bar, and plunged it four feet below the bottom of the trench. On pulling it out, to his astonishment, a great quantity of water welled up through the hole it made, and ran along the drain. From this he inferred that large bodies of water are pent up in the earth, and may often be let off by tapping with an auger or rod.

From that time he busied himself in finding out the seat of springs, and being possessed of great natural shrewdness he was generally successful. This has always been found an exceedingly difficult task, even for those who are well acquainted with science: no wonder, there-

fore, that the natural skill of Elkington, brought him into high repute. By making a few deep drains in the most essential spots, he stopped the evil at its commencement, and drained the land much more effectually than he could have done by making a number of small conduits near the surface. His method of drainage, compared with the old system, has been aptly likened to blood-letting with a lancet, which affects the general constitution much more than the local application of leeches. The principle on which Elkington worked has been thus shortly stated: "It was to discover what may be called the mother-spring, and to cut it off by one deep drain passing across, but above the spot where it breaks out. The boring at the bottom of this deep cut had sometimes considerable effect, not only on the spring immediately in contemplation, but on others also that become visible at a distance, and even on the opposite side of a hill more than a mile from the spot." Elkington also found that, in cases where stagnant water on the surface arose from sunken beds of clay, he could sometimes get rid of it at a very little expense, by perforating the clay with a long iron dibber, and thus allowing the water to sink into the next bed of loose earth beneath.

At the request of the Board of Agriculture, Elkington communicated the whole of his system to Mr. J. Johnstone, who prepared the published account. Through the influence of the same Board also, the services of Elkington were brought before the notice of Parliament, who voted him a reward of one thousand pounds for the benefit conferred upon the country.

Since that time all our systems of *deep draining* have been founded on Elkington's, and have proved extremely valuable where the wetness arises from below; but where rain and snow water accumulate on the surface, the numerous channels afforded by *surface draining* are found advantageous. The state of things indicating that surface draining is needed, has been thus ably stated as it

regards Scottish husbandry, and the experience of English farmers will testify that these remarks are too applicable to many parts of our own country:—

“The injury done by stagnant water to arable soil may be estimated by these effects. While hidden water remains, manure, whether putrescent or caustic, imparts no fertility to the soil; the plough, the harrow, and even the roller, cannot pulverise it into fine mould; new grass from it contains little nutriment for live-stock; and in old, the finer sorts disappear, and are succeeded by coarse sub-aquatic plants. The stock never receive a hearty meal of grass, hay, or straw from land in this state, they being always hungry and dissatisfied, and of course in low condition. Trees acquire a hard bark and stiffened branches, and become a prey to parasitic plants. The roads in the neighbourhood are constantly soft, and apt to become rutted; whilst ditches and furrows are either plashy, or like a wrung sponge, ready to absorb water. The air always feels damp and chilly, and from early autumn to late in spring the hoar-frost meets the face like a damp cloth. In winter the slightest frost encrusts every furrow with ice, not strong enough to bear one's weight, but just weak enough to give way at every step, while snow lies long lurking in shaded corners and crevices: and in summer, mosquitoes, green-flies, midges, gnats, and gad-flies, torment the cattle, and the ploughman and his horses, from morning to night; whilst in autumn the sheep get scalded heads, and are eaten up by maggots, during hot blinks of sunshine. These are no exaggerated statements, but such as I have observed in every county in Scotland, in hill, valley, and plain; and wherever such phenomena occur, it may be concluded that stagnant water lurks beneath the soil upon a retentive subsoil.”\*

Surface drains are of two kinds, open, and covered. Open drains are made in the hollows or lower parts of land, and are proportioned in size to the quantity

\* Stephen's Manual of Practical Draining.

of water to be carried away. Whatever may be their depth, they must be made with sloping sides to prevent the crumbling down or undermining of the banks. They are very useful in some situations, but occasion much loss of soil.

Covered drains of the simplest kind are trenches made to the depth of two or three feet, and then filled with stones or rubbish to within a foot of the surface. They are made in hollow places where the water naturally tends, and they are often found valuable, although not very permanent in their effects.

A more useful drain is that in which a conduit is formed at the bottom, to afford at all times a free passage for the water. This conduit may be made in a rough way, by placing dry stones in such a manner as to leave a cavity at the lowest part of the drain. Or walls may be roughly built with masonry about six inches high, and the space enclosed covered in with flat stones, so as to leave an opening six inches wide.



Drain with  
conduit.

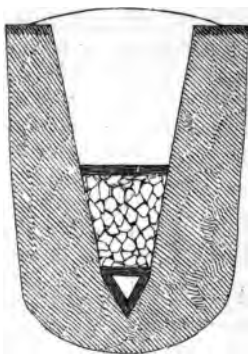
The remainder of the drain is then filled in, first with stones fitted together, that they may not allow the earth to get in and choke the drain; then with a layer of straw, heath, or furze (for the same purpose of keeping the drain free of earth); and lastly, with the natural soil which had been dug out in making the drain. This may be piled up in a curved form over the drain, because it will be sure to sink afterwards to the common level of the field.

The stones used for this kind of drain may be sand-stone, or any of the harder stones; but where these cannot be obtained, draining-tiles are employed, and are far more effectual. The more quickly water can be conveyed away from the soil the better, and draining tiles, when properly made, effect this better than conduits made of

separate stones, and far more perfectly than drains composed merely of a mass of loose stones, or rubbish.

Draining tiles, when of the best form, are one-fourth higher than they are wide, the sides nearly perpendicular, and the top rather abruptly turned. Such as spread out at the sides and are flat at the top, prove weak and bad for conveying water. Such as are without *soles* or flat tiles at the bottom are liable to sink and get out of place. Some drainers, indeed, think *soles* unnecessary in hard-bottomed land: but it is scarcely to be doubted that the quantity of water constantly sinking to the bottom of the drain must gradually soften the stiffest clay, and cause the tiles to sink and become less effectual. This the *soles* would entirely prevent. A great objection to *soles* has been their cost; but in places where slate is to be cheaply obtained this may be used as a substitute.

The breadth of the sole determines the width of the bottom of the drain. Sometimes it is made ten inches wide, the tile being four or five inches inside measure: where the tile is smaller, the sole is also narrower in proportion, except in main-drains, where it is always of one width. The sole therefore always exceeds the width of the tile, and it is better that it should be wide than narrow in proportion, the space on each side being filled in with earth, or with stones and clay. The length of the draining-tile is from twelve to fifteen inches, the latter being in some respects the best, giving less trou-



ANOTHER FORM OF CONDUIT.



DRAINING-TILES WITH SOLES.



ble to the workman, and being little likely to get out of place in the drain.

In setting the tiles upon the soles care is taken not to let the joins correspond, but to have the joinings of the tiles intermediate with those of the soles, so as to give steadiness to both. In places where two drains meet there was formerly some difficulty in uniting them without the danger of getting the drain choked by broken bits of tile or stone: this has been since obvi-



ated by making main-tiles with an opening on one-side, for this express purpose, so that the branch drain-tile can be fitted into it with perfect exactness. Where the branch-drain is smaller and not so deep as the main-drain, it is often simply brought with its end resting upon the main, and the water will soon find its way into it. The principal main-drain of a field is made on its lowest side, and forms the outlet from which the whole water of the field generally flows. In making this drain at first, much trouble is saved by a little attention to order and regularity. While some of the workmen are making the trench of the required depth and size, others are bringing the tiles and soles in carts, and

**DRAIN-SCOOP.** laying them down, not promiscuously, but in the most convenient manner for the hand of the workman who will lay them in their places; that is, the tiles should be placed end to end along the whole line, and a sole placed against every tile on the side nearest the drain. At regular distances, where branch-drains are to meet the main, the tiles already spoken of, with openings in their sides, together with the common tile which is to fit into each, should be laid down in their places. All this will save time and trouble afterwards.

The trench being finished, and the sides and bottom

neatly trimmed with the narrow drain-spade, the workman proceeds to lay the soles and tiles, standing constantly in the trench, and having them handed to him by an assistant. The width of the main-drain sole is ten inches, whatever the size of the tile to be laid upon it; it also fits exactly the bottom of the drain. The tiles and soles, when once laid down, are carefully secured in their places by earth firmly pressed between them and the sides of the drain. The main-drain is completed by building masonry, to protect its mouth, where the water will be discharged into a ditch. It is a good plan to place an iron grating across the opening, to prevent rats from entering it.

NARROW  
DRAIN-  
SPADE.

When the main-drain is thus finished, the smaller drains have to be proceeded with, and in these the nature of the work is very much the same, the operations being repeated on a smaller scale, with a very narrow drain-spade and small soles and tiles.

Many attempts have been made to contrive a drain-tile which shall answer the purpose of sole and tile in one, and thus lessen the cost. The simplest form is a mere cylindrical pipe tile, which might answer every purpose were it not for the difficulty of fixing it so perfectly, end to end, as to ensure the flow of water. The least displacement of one of the tiles would evidently destroy the drain and injure the land. There are



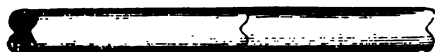
CYLINDRICAL PIPE-TILE.



PIPE-TILE, WITH COLLAR.

several contrivances for preventing the cylindrical pipe-tile from slipping out of its place. One of these is a

short cylinder or collar to be drawn over it so as to cover the part where two tiles meet; another plan is to make the ends of the cylinders lobed or waved so as to fit into each other. But these, and similar contrivances



PIPE-TILE, WITH LOBED ENDS.

all involve extra expense, and are not desirable, on that

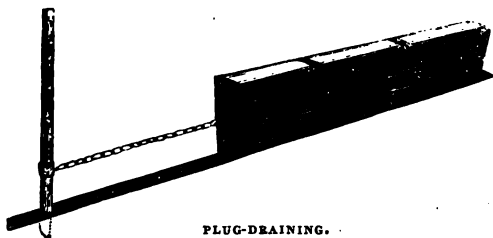


IMPROVED FORM OF PIPE-TILE.

account. A cheaper kind of pipe-tile is that in which the shape resembles a united sole and tile, and of which there

are also several varieties.

There is a form of draining, not yet very extensively employed, called *plug-draining*. It is advantageous on heavy soils where stones are scarce, and where the sub-soil is of unctuous clay. A narrow trench is cut in the



PLUG-DRAINING.

clay, into which plugs of wood are fitted having a chain attached to one end. After the clay and earth are well beaten down among these plugs, they are drawn forward by means of the chain, leaving a hollow drain in the clay itself. In this way piece by piece is formed as the plugs are drawn onward in the trench.

The same purpose is answered, but less effectively, by the *mole-plough*, which is an implement framed so as to make a small conduit beneath the soil, by means of an iron-pointed cone or share. It is best adapted to strong clay lands, for in other soils the conduit thus formed is almost immediately obliterated.

Although a certain degree of success attends every attempt at drainage, yet the cost is so great that no one will rashly venture upon it without real necessity for so doing. A farmer will be very careful how he sinks valuable capital in injudicious draining, thereby crippling his resources, and preventing him from carrying on other necessary improvements which equally demand his attention. There can be no doubt that a vast extent of arable land throughout Great Britain and Ireland is seriously injured by the imperfect escape of water, and its fertility greatly diminished thereby; yet sound judgment is required in applying the remedy; for many persons competent to make a good drain, may fail of full success from not making it in the right place, and may therefore waste money and time in the attempt. Some knowledge of the structure of the upper portion of the earth's crust must be acquired; and also a practical acquaintance with those circumstances in which deep draining is required, and of those in which a different management may be adopted.

When draining operations are actually going on, the business should be constantly superintended by a person who well understands it. Without this, half the benefit will be lost through the carelessness of the workmen, who will naturally take the methods that seem to give the least present trouble. The spade-work will be roughly done, the tiles carelessly laid down, and perhaps the drain left open for a long time in wet weather or frosts, at the risk of the giving way of the banks, and the bursting in pieces of the tiles. All this is easily prevented by the presence of an active superintendent.

It will be impossible here to go into many details respecting deep draining, nor will it be necessary, since the principal differences refer simply to the greater depth and smaller number of the drains, and to the skill with which they are placed in the most important spots. On account of the depth of these drains, there is sometimes a tendency in the sides to fall in before the bottom is reached. In this case, short thick planks are placed on each side, and are kept in their places by props across the breadth of the drain. The conduit at the bottom of a deep drain should always be built securely, by a person who understands the construction of dry-stone walls, and he should take care to lay flat stones at the bottom, to act as a sole to the drain, and also to cover in the top of the conduit with flat stones. Stones are then filled in promiscuously, either by hand or from carts: in the latter case, boards must be placed in a slanting position, to break the fall of the stones, and thus to save the drain itself as well as the conduit from injury. As in the case of the drains already described, a layer of some dry material, such as turf, dried leaves, or coarse grass, is put over the stones before the loose earth is returned.



AUGER.



PUNCH.



JUMPER.

It will sometimes happen that even a drain six feet deep will not reach the seat of the water which it is desirable to withdraw from the soil. In this case, boring

irons are sometimes used; and, as in the case which is said to have originated Elkington's plan, the water will well up into the drain, and so pass off, or it will sink down into some porous bed, and so be absorbed. The tools chiefly used in deep-draining, are the ditcher's shovel, the hand-pick, and foot-pick, and, where boring is resorted to, the common auger, a sharp pyramidal punch, and a chisel or jumper, for making way through obstacles in the soil.

The results which follow successful draining, on Elkington's method, may be gathered from the following description of the estate of Spottiswoode, in Berwickshire, as given by Mr. Black in his Prize Essay. "Bursts and springs which formerly disfigured entire fields, and which rendered tillage precarious and unprofitable, are now not to be seen; and swamps, which were not only useless in themselves, but which injured all the land around them, have been totally removed. The consequence is, that tillage can now, in those parts, be carried on without interruption, and with nothing beyond the ordinary expenditure of labour and manure; and a sward of the best grasses raised and continued on spots which formerly only produced the coarsest and least valued herbage. . . . The hurtful effects of rime or hoar-frost on vegetation, is a circumstance familiar to all who have had experience of cold and elevated districts, or of low lands subject to exhalations, excluded from the influence of the sun and currents of air. The rime in these swampy hollows, of which mention has been made, was found, even in the warmest seasons, to be productive of serious inconvenience and injury to the growing crops; and that chiefly at the period when the grain was approaching its mature state. This evil, it may be said, has been removed, or at least is now so little felt, that the grain produced in these very hollows has for many years escaped the smallest perceptible injury from this course.

"Another effect which was still less contemplated, and has not less agreeably resulted from the drainage under-

taken, has been the improvement of the trees and woodlands on the property. Considerable difficulty was experienced in nursing up the trees in the first stages of their growth; and often individual trees grew up with stunted stems, and covered with parasitical plants, which always indicate unhealthy growth. Latterly, this evil has been infinitely less felt, owing in a material degree, certainly, to the superior management of the woods themselves, but obviously also, in a certain degree, to the great dryness of the ground. Since several of the woods have been laid dry by under drainage, the ground in many of the hollows has sunk so much, that the roots of the trees have been left standing up bare above the surface, with the appearance of crows' feet; and parts which were boggy and marshy, and in which sportsmen used to stick fast in hunting, are now perfectly solid, with a good sward of grass, over which they may now gallop with freedom."

Mr. Stephens also sets forth the benefits of draining, in terms which apply to thorough draining, namely, the best kinds of surface draining, equally with deep-draining.

"On drained land," he says, "the straw of white crops shoots up steadily from a vigorous braid, strong, long, and at the same time so stiff, as not to be easily lodged with wind or rain. The grain is plump, large, bright-coloured, and thin-skinned. The crop ripens uniformly, is bulky and prolific; more quickly won for stacking in harvest; more easily thrashed, winnowed, and cleaned, and produces fewer small and light grains. The straw also makes better fodder for live stock. Clover grows rank, long, and juicy, and the flowers large and of bright colour. The hay weighs heavy for its bulk. Pasture-grass stools out in every direction, covering the ground with a thick sward, and produces fat and milk of the finest quality. Turnips become large, plump, as if fully grown, juicy, and with a smooth and oily skin. Potatoes push out long and strong stems, with enlarged tubers, having skins easily

peeled off, and their substance mealy when boiled. Live stock of every description thrive, show good temper, are easily fattened, and of fine quality. Land is less occupied with weeds, the increased luxuriance of all the crops checking their growth. Summer fallow is more easily cleaned, and much less work is required to put the land in proper order for the manure and seed; and all sorts of manures incorporate more quickly and thoroughly with the soil."

Taking all these benefits into consideration, we may well desire to see the practice of draining become universal in all the low lands of this country and of Ireland. Indeed, it is not merely as a matter of national and individual benefit as it respects our crops and live stock that we have to view it, for medical observations have shown that in districts which have been thoroughly drained, fever and ague, which previously formed nearly one half of the diseases of the people, have now almost entirely disappeared. Perhaps many persons now in middle life will remember that in their childhood they heard much more of these complaints than at present, and that ague especially was commonly spoken of as a disease they were likely, without care, to suffer from.

That we now hear comparatively little of this painful complaint, and that both ague and fever are much less fatal and extensive in their ravages than formerly, we greatly owe, through God's mercy, to the improved drainage of the soil, and the consequent improved climate of large districts of this country. And may we not hope that *consumption*, that saddest of all messengers of death, may deal less destructively with us, when we have used all the means placed within our reach for lessening the amount of moisture, which, in the shape of mists and fogs, hangs almost continually over many beautiful valleys of our land. At least let us pray that God will so be pleased to bless the attempts which are being made to ameliorate the climate and the soil.





DANTEIC.

## APPENDIX.

---

### ENGLAND'S RESOURCES IN TIME OF DEARTH.

It is a merciful provision of the Almighty, that, in time of dearth, one country is frequently enabled to supply the deficiencies of another, and that one year often supplies a redundancy to help out the scarcity that may follow, or has preceded it. When the famine was "sore" in the land of Canaan, and in the adjoining countries, Jacob said to his sons, "Behold, I have heard that there is corn in Egypt: get you down thither, and buy for us from thence; that we may live and not die." In this case the famine had been foretold, and the resources of Egypt had been wisely husbanded by Joseph during the years of plenty which preceded the time of dearth. And even now, seasons of comparative scarcity, though not foretold, are in some measure anticipated and provided for, either by government, as in foreign countries, or, as at home, by a class of persons who, in seeking to promote their own interests, are really serving the interests of the nation at large.

"In Sweden, Prussia, Spain, Denmark, &c. magazines or storehouses of grain are erected in different places, in order to guard against bad seasons. In Spain alone, there are upwards of five thousand of these depositories, called *positas*. Every occupier of land is obliged to bring a certain quantity of corn, proportionate to the extent of his farm; the following year he takes back the corn he has thus deposited, and replenishes the empty garner with a larger quantity; and thus he continues annually to increase the stock by these contributions called '*cresus*,' till a certain measure of grain is deposited; then every one receives back the whole corn which he has furnished, and replaces it by an equal quantity of new corn. Whenever a scarcity happens these repositories are opened, and the corn is dealt out to the people at a moderate price. In some places seed corn is distributed to necessitous husbandmen, who are bound to restore as much in lieu of it the next harvest. The

institution of such a system as this is no doubt highly necessary in a country only in an imperfect state of civilisation; but that which requires the authority of government to accomplish abroad, is in England brought about by less questionable means." \*

The commercial and enterprising spirit of our countrymen induces them to enter into speculative purchases, which in the end answer very much the same purpose. Our corn merchants purchase largely in years of plenty when prices are low, and store up wheat in expectation of an advance in the price. Thus, without intending to promote any other interest than their own, they really become the benefactors of the public, by providing a relief stock, which is of the greatest importance in a time of scarcity, and also by laying up what might otherwise be wastefully consumed while plenty lasts. Instead, therefore, of joining in the common cry against such persons, we have reason to be thankful that there are men of sufficient capital and experience to make these purchases, and that they are, generally speaking, disposed to sell immediately they can realize a fair profit. And if there are some who hold their corn in the hope of realizing enormous gains, and wait until the market begins to decline before they sell, it is often to their own shame and loss that they do it. The scarcity they create induces importation, and is thus more than compensated by the good eventually done. The immense amount of capital required to store corn largely, and the waste to which it is liable in the granary, also greatly check the desire to withhold corn too long.

Whatever may be the precautions employed by merchants and others in laying up for the future, there will be times and seasons, when we must look to other nations for a large amount of help as it regards our supply of corn. A total failure of crops scarcely ever happens throughout even one kingdom, for the weather which is unfavourable to one description of soil is generally advantageous to another; much less does it happen at the same time throughout the whole earth, in the various parts of which seasons and climates so greatly differ. Thus recently, when Europe suffered in many parts a great deficiency in her harvests, it was so arranged by the bounty of the Creator, that America should receive an overflowing supply. How important then the continuance of peaceful commerce, and rapid communication between all

\* Dimsdale.

nations, that the deficiencies of one country may be supplied by the abundance of another!

It is at a season of scarcity that we feel the value of our foreign commerce, and eagerly inquire whence we may most speedily and safely obtain our supplies. At the same time it must be remembered, that our grand supply is as a general rule produced at home; for, in no case can a numerous people, like that of the United Kingdom, be wholly or principally dependent on the soil of other lands for support. This might, perhaps, take place without much danger or inconvenience in the case of a small state or colony, but not with such a dense population as ours. For it is an ascertained fact, that "to supply these islands with the single article of wheat would call for the employment of twice the amount of shipping which now annually enters our ports, if indeed it would be possible to procure the grain from other countries in sufficient quantity; and to bring to our shores every article of agricultural produce in the abundance we now enjoy, would probably give constant occupation to the mercantile navy of the whole world."\* †

But while our grand dependence will always be on our own resources, and on the advancing skill of our agricultural men, who, by improved systems of tillage and drainage, have of late years wonderfully increased the productiveness of the soil, yet there are times when a concurrence of circumstances will drive us to seek very extensive aid from other countries. The deficient harvest of 1846, and the pressure occasioned by the failure of the potato crop, produced in our own country and among many of the continental nations severe calamities, and great anxiety respecting the future. Through the mercy of God a favourable harvest followed; but by the circumstance of this scarcity we are naturally led to review the chief sources we have been accustomed to look to for our foreign supplies of corn, and to see how many of these remain available to us. To begin then with Europe as the quarter from whence we have obtained, until lately, nearly the whole of our foreign supplies of corn.

At the head of all the corn-shipping ports, not only of Europe, but of the world, is Dantzic, situated on the left bank of

\* Porter.

† In 1843, the total quantity of wheat imported into this country did not exceed 940,120 quarters; in 1844, it amounted to 1,100,305 quarters. In the same years, the total imports of wheat meal, or flour, were 436,878 cwt. and 985,285 cwt. respectively.

the Vistula, about three miles from the sea (the Baltic). This is the grand emporium for the countries bordering the Vistula, both in its passage through Poland, and through part of Prussia. The soil in the neighbourhood of this river produces luxuriant crops, and is in every respect highly fruitful; but so extensive is the region from which corn is brought, that in seasons when there is a brisk demand, Dantzic is partly supplied from provinces from five to seven hundred miles inland. A large proportion of the corn-trade at this port is in our hands, therefore it is interesting to ascertain all particulars respecting the collection and mode of transit of these valuable stores.

Considering the great importance of wheat one cannot view without regret the careless and wasteful plan on which grain is conveyed from the corn-growing districts of the Vistula to Dantzic. From Cracow, where the Vistula first becomes navigable, down to the lower parts of the stream, the corn is chiefly conveyed to Dantzic in open flats. These are made on the banks in seasons of leisure, and are left to be floated when the rains of autumn, or the melted snows of the Carpathian mountains in spring, have raised the river far beyond the ordinary level. These barges are about seventy-five feet long, twenty broad, and two feet and a half deep. They are made of fir, put together in a very rough manner, and fastened with wooden trenails; the corners being dovetailed and secured with slight iron clamps—the only iron used in their construction. A large tree the length of the vessel runs along the bottom, to which the timbers are secured. This tree rises nine or ten inches from the floor, and hurdles are laid down upon it, extending to the sides. These hurdles are covered with matting made of rye-straw, and serve the purpose of drainage, there being a vacant space beneath to receive the water which leaks through the sides and bottom of the ill-constructed vessel. This water as it accumulates is dipped out at the ends and side of the vessel.

The cargo usually consists of from one hundred and eighty to two hundred quarters of wheat, which is simply thrown on the mats, piled up to the gunwale, and left uncovered, exposed to all the inclemencies of the weather and the pilferings of the crew, which consists of six or seven men. The barge is carried along at a slow pace by the force of the stream, and is preceded by a small boat with a man in it, who is employed sounding in order to avoid the shifting banks. The men on the barge merely use oars at the head and stern to direct the vessel in passing under bridges, or in avoiding sand-banks.

Their progress in this way is very slow, so that several weeks, and even months, may be employed in the voyage. During this time, if the weather be rainy, the natural consequence is that the wheat begins to grow, and the barge speedily assumes the appearance of a floating meadow. The more rapidly this takes place the better, for the shooting of the fibres soon forms a thick mat, and prevents the rain from penetrating more than an inch or two. At the sacrifice of the whole upper surface of the wheat a covering is thus provided for the great bulk of the grain, which, on the removal of its green roof, is often found in very tolerable condition.

When the cargo is deposited at Dantzic the barges are broken up, and the men who conducted them return to their own country on foot. The grain, as it may be supposed, is not fit to be immediately placed in storehouses. It is spread out on the ground, exposed to the sun, and thoroughly dried. During rain, and also at night, it is piled up in the shape of a steep roof, and is covered with linen. Thus, according to the state of the weather, it may be a long or a short time in reaching the granary.

Near the lower parts of the river, where the wheat is generally of inferior quality, covered boats are employed with shifting boards, which protect the cargo from rain, but not from pilfering. The charge for bringing wheat from Cracow to Dantzic by water, is eight shillings per quarter; from Warsaw to Dantzic, five shillings. Land carriage is much dearer. From Lemberg, the principal corn-market of Galicia, wheat is brought by a tedious land route, and the cost of its conveyance to Dantzic is no less than twenty-six shillings per quarter. But all this is while steam conveyance is in its infancy. The progress of railway and steam-boat communication will, no doubt, make a great alteration in this district before many years have elapsed.

The excellent quality of much of the wheat, grown in Poland, causes it to be highly prized in this country. The fine heavy grain, known in London as Dantzic white wheat, is raised in a narrow district, in the province of Sandomir, Poland,—about sixty miles in length, and extending along the Vistula. Throughout the southern parts of Sandomir and Cracow, the crops are celebrated for their excellent quality; but the average growth is rarely beyond twenty bushels to the acre, the farming operations being imperfectly conducted.

In Volhynia, one of the principal districts for supplying

wheat to the markets of Dantzic and Königsberg, the population consists entirely of slaves, and either the proprietor farms his own estate, or lets it to what are called "Possessors," at the rate of so much per day's labour, calculated for the peasant: thus the proprietor receives so many days' labour, or rather he receives so much money for each day's labour of the slave.

We have already seen that the grain from various districts, on arriving at Dantzic, is dried thoroughly, and afterwards stored in granaries.

These warehouses are generally seven stories high, with floors nine feet asunder. There are numerous windows for the ventilation of the corn, and sufficient spaces for turning and screening it. The whole of the corn warehouses are capable of storing five hundred thousand quarters of wheat. Ships are loaded by gangs of porters, who will complete a cargo of five hundred quarters in three or four hours. These granaries are situated on an island formed by the Motlau, and are guarded by twenty or thirty ferocious dogs of large size, among which are blood-hounds. The dogs are let loose at 11 o'clock at night, and are kept within their districts by large high gates across the end of each of the streets leading to the main one. No light is allowed, nor any person suffered to live on this island: The dread of the dogs, it is said, is the most powerful means which could be used to keep the property secure amidst the hordes of Poles, Jews, &c., which are met with at Dantzic. No fire or robbery was ever known, and the expense to each building, with the immense property it contains, is very small. Vessels lying alongside these warehouses are not allowed to have a fire or a light of any kind on board, nor is a sailor or any other person suffered even to smoke.

These corn-stores of Dantzic, and the care taken to preserve them, are interesting and important topics; but the general inquiry will be—at what season and to what extent are these stores available to us?

Now we find that the Prussian and Polish landlords employ brokers at Dantzic to dispose of their wheat for delivery the following spring, and that the wording of the corn-contract generally fixes the period for the fifteenth of May, depending, however, on the weather for the exact fulfilment of the contract, as the breaking up of the ice, "first open water," may take place at an earlier or later date.

The deliveries of grain, therefore, commence about the middle of May at that port, and are generally of great extent.

The exports of wheat at Dantzic for England, in 1842, were 353,881 quarters. The freight or carriage per quarter to England is about 3s. 6d. or 4s.\* Of course the supplies must vary greatly with the state of the adjacent countries, in some of which there may be prohibitions against the exportation of wheat, on account of a deficient crop.

Next to Dantzic, Hamburg is considered the greatest corn-market of Northern Europe, being the depository for large quantities of Baltic corn, as well as for the produce of the countries bordering the Elbe. The price of wheat at this port is in general much lower than at Dantzic; but this is owing to the inferiority of Holstein and Hanover wheat, which abounds in this market. In 1830 Hamburg sent to the various British ports 271,700 quarters of wheat, besides a large quantity of barley, rye, and oats. The freight per quarter is from 2s. 6d. to 5s., but in extraordinary cases it rises to 8s. or 10s. per quarter.

Hamburg owes its importance, as a commercial town, entirely to its situation at the mouth of the Elbe. This fine river, in its long and winding course, intersects a vast extent of country, and affords great facilities for trade. Natural advantages are also enhanced by artificial means,—a water communication having been established by means of the Spree, and of artificial cuts and sluices between the Elbe and the Oder, and between the latter and the Vistula. Thus a considerable part of the produce of Silesia, destined for foreign markets, and even some of that of Poland, finds its way to Hamburg. By another canal, communication is also obtained with the river Trave, and consequently with Lubeck and the Baltic, thus saving the dangerous and difficult passage of the Sound. From the wide extent of country thus traversed, corn can be easily and safely conveyed to the general dépôt at Hamburg, where a ready market awaits it. Notwithstanding the amount of trade carried on, there are no docks or quays at this port; but vessels moor in the river outside a series of piles driven into the ground, a short distance from the shore. There is a sort of inner harbour formed by an arm of the Elbe, which runs into the city, where small craft lie and discharge their cargoes. Most of the Danish corn is consigned to Hamburg; but this has not hitherto been of great amount. In 1831 we imported from Denmark 55,960 quarters of wheat.

\* In this and the following cases the freight to the west coast of England would be about sixpence per quarter higher.



Continuing our inquiries in the north of Europe, we find that several parts of Russia have sent us large supplies of corn, and will, doubtless, continue so to do. Petersburg, the capital of Russia, has the most extensive general foreign traffic of any city in the north of Europe. The number of vessels annually entering the port varies from a thousand to sixteen hundred, of which the English are by far the most numerous. The Russians traffic with foreigners at Petersburg, either personally or by their factors, during the winter months, and the goods are delivered in May, (when the shipping season commences,) or in the three succeeding months. The freight of wheat per quarter is from 4s. 5d. to 5s.

In the case of produce brought from northern countries, it will of course happen, that the time of its arrival here will depend more on the breaking up of ice, and on the earlier or later arrival of "the shipping season," than on any considerations relating to the harvest. In those countries, the close of harvest is not only the season for a suspension of agricultural labour, but is one in which foreign commerce must also be put a stop to; therefore it is that autumn or winter purchases of corn in northern ports are made with relation to the following spring.

The corn-trade of Petersburg is of considerable importance, although the greater part of the wheat is of inferior quality. There are three varieties of wheat, known as *azemaia*, or soft wheat: *kubanka*, or hard wheat; and Russian, or inferior small-grained wheat. The last, which is the most abundant, is of a very dark colour, and, though sound, is unfit for the manufacture of fine bread. The hard wheat is the most prized, being a large semi-transparent grain, well calculated for long keeping, either in the granary, or when made into bread; so that it is in great request for mixing with grain that is stale or out of condition. When first brought to London the millers objected to it on account of the difficulty of grinding it; but having now ascertained its excellent qualities, they are glad to purchase it for mixture with other grain.

The next port of consequence in European Russia is Riga, the largest part of whose foreign trade is transacted with England. Riga wheat is, however, inferior to that of Dantzic, and the port has now become more celebrated for flax than for corn. Two descriptions of wheat reach us from Riga; one the growth of Russia, the other of Courland: the latter is much the best. Oats are likewise largely exported from Riga. The freight of wheat per quarter is about 4s. 9d.

Russia has still another port in the extreme north from which corn is exported: but the great severity of the climate must always prevent much dependence being placed on these supplies. This port is Archangel, on the right bank of the Dwina, the principal city of a province bearing the same name, part of which is exposed to the Arctic Sea. So great is the sterility of many parts of this province, that the inhabitants use the inner bark of trees, and certain species of moss, intermixed with meal, or substituted for it, in making bread. It is, therefore, not in this province itself, but in those farther inland that corn is raised for exportation.

The chief ports of northern Europe to which our merchants have been accustomed to resort for corn, have now been briefly noticed, namely, Dantzic, Hamburgh, Petersburg, Riga, and Archangel: we may add, that Amsterdam is also an important dépôt where the wheats of the above-named ports are to be met with, as well as almost every other variety of corn,

Let us now turn our attention to Southern Europe, and consider the fertile and beautiful country of Spain. Scarcely thirty years ago, no corn was permitted to be exported from Spain under severe penalties; but the inhabitants are now free to export as largely as they please, not only corn, but all other produce of the soil. And this they might do to an immense extent under a better state of things; but, owing to the badness of the roads, which prevent their getting a ready market for their supplies, they can scarcely be said to cultivate the land at all. Yet, such is the natural fertility of the soil, that the crops are very abundant; and in good years they so far exceed the wants of the inhabitants, that the peasantry do not take the trouble to reap the more distant fields, but merely clear such as are in the immediate neighbourhood of their respective villages. How important to these people, in every point of view, would be the ordinary facilities for commerce! What a motive for industry, and most probably what an improvement in the national character, had they the means of turning the produce of their fields to account! As it is, the habit of allowing the precious fruits of the earth to be wasted, because no immediate profit can result from securing them, must be full of mischief to the proprietors, and to the peasantry, inducing general improvidence and carelessness. Let us hope that in the course of improvement, which seems rapidly advancing in foreign countries as well as in our own, the commerce of Spain will be greatly increased, and the produce of Old Castile, Leon, Estremadura, and Andalusia, (said to be

the finest corn-countries in the world,) will at length be turned to rich and profitable use. Latterly we have begun to import corn from Bilbao, Santander, and other ports in the north of Spain; and in 1831, we obtained no less than 158,000 quarters from that country. The supplies brought to Bilbao are, however, principally from a distance of 130 or 140 miles; and, owing to the badness of the roads, and the deficient means of conveyance, the rate of carriage advances enormously when there is a brisk demand.

The only port of Southern Europe from which any considerable quantity of grain is to be had, is Odessa, a flourishing



ODESSA.

port of Southern Russia, situated on the north-west coast of the Black Sea. All the products brought down the Dniester and the Dnieper rivers are exported from Odessa; but owing to the cataracts and shallows of those rivers, which make their navigation dangerous, a large proportion of the corn is conveyed to Odessa by land, and this by a less expensive method than might be supposed. Carts laden with corn, and drawn by oxen, are to be seen slowly wending their way towards Odessa, in parties of about one hundred and fifty together. The time

chosen is that in which the peasantry are not occupied with harvest work; and as the oxen are pastured at night, no time is unnecessarily lost during the journey.

Two kinds of wheat are shipped at Odessa, hard wheat and soft; the latter is the most abundant, and is the only kind that finds its way to this country. The hard wheat is a very fine grain, chiefly sent to Italy for making macaroni and vermicelli. The freight of corn from Odessa to England is 10*s.* per quarter.

Contrary to the practice of the northern ports, the voyage from Odessa is generally made during the winter months; but at all seasons it is a long and uncertain voyage. The reason for preferring to make it in winter is, that in summer the wheat is almost sure to heat during the voyage, especially if it has not been shipped in the best order. Sometimes this heating has gone to such an extent, that the wheat has been dug from the hold of the vessel with pickaxes. The winter voyages usually commence before the end of October, for, in autumn and winter, the navigation of the Black Sea becomes dangerous. From the vast quantity of fresh water poured into this sea, the saltness is so much diminished, that, with a slight frost, the surface of the water becomes covered with ice. Thus we find that winter voyages are dangerous to the ships, and summer voyages to their cargoes of corn; and, unless these risks can be lessened, it is not probable that we shall ever import very largely from Odessa.

But were the voyage less uncertain, there is very little prospect of an increase in the exports of corn from Odessa, for the following reasons: 1. In Podolia and Kievy, whence Odessa obtains its principal supplies, the greatest possible quantity of grain is already produced without regard to price or demand, in consequence of capital being invested in slave-labour, which is not otherwise to be employed. 2. Because the plains, called steppes, adjacent to the Black Sea, and Asoph, are thinly peopled, so that in years when crops are abundant they are seen suffering on the ground for want of reapers. 3. Because on these steppes crops are exceedingly precarious by reason of drought, the common calamity of this climate; of the high winds, which carry off the seed from the dusty soil; of the early thaws and subsequent frosts without snow. 4. Because tillage is defective and improvement difficult under the present circumstances of the country. 5. Because distances are great and communication unaided by art, there being no roads, and the rivers being unnavigable. 6. Because the landholders are

impoverished, and the most of them indebted to the crown, and the working classes are degraded by their condition of slavery.\*

Looking beyond Europe, we find that exportations to a considerable amount are sometimes made from Egypt, a country greatly enriched by the annual deposits of mud from the river Nile, and bearing, with very little assistance from the husbandman, three or four crops every year. In Lower Egypt, sowing begins as soon as the waters subside, the seed being merely scattered over the land, and left to sink into the soft earth by its own weight, or trodden in by cattle driven over it for that purpose. This generally takes place in November; in February the fields are green, and in May the harvest takes place. The quantity reaped is very variable, but the pacha informed Dr. Bowring that he had exported in one year 630,000 quarters, producing on an average about sixteen shillings per quarter. The freights for grain from Egypt to England last paid are 15s. 3d. per quarter for small vessels, and 13s. for larger ships.

Thus in the present day, as in the time of the Pharaohs, the neighbouring nations may go down to Egypt to buy bread. Stores of corn are still laid up, and a singular method is adopted to secure them from theft. It seldom happens in Upper Egypt that there is any roof to cover the grain; nor is a covering necessary, as rain is scarcely ever known to fall; but the corn being collected into a heap, is stamped all round the foot of the heap with the impression of a large wooden seal, so that nobody can touch the pile without deranging the impression.

It might have been expected, from the fertility of the soil and the beauty of the climate, that Syria would have had an overplus of corn, and be able to export it to other lands; but so great is the want of agriculturists and labourers, that the fields lie comparatively waste. "Regions of the highest fertility remain fallow; and the traveller passes over continuous leagues of the richest soil, which is wholly unproductive to man. Nay, towns surrounded by lands capable of the most successful cultivation, are often compelled to import corn for the daily consumption, as is the case at Antioch, in whose immediate neighbourhood the fine lands on the borders of the Orontes might furnish food for hundreds and thousands of inhabitants."

From our distant possessions in South Australia, it appears that sufficient corn is now raised, not only to supply the wants

\* Report to Lord Palmerston, from the British Consul at Odessa.

of the colonists, but to allow of exportation. In a petition to the Secretary of State for the Colonies, dated Adelaide, 11th of April, 1844, it is stated that, as far as wheat is concerned, the production is already beyond their wants, to the extent of about two hundred thousand bushels; and they are, in default of markets, suffering under a most ruinous depression of prices.

Turning now from the Old World to the New, let us inquire concerning the resources of North America, and her power to supply us with corn in the time of need. As far as extent and capabilities of soil are concerned, every one knows that the resources of even our British possessions in that country are almost boundless. It has been well said, "Our colonial wastes are mines of gold: millions of treasure slumber in our unappropriated lands." Canada alone is about six times as large as England and Wales; and the whole area of our British North American provinces is more than twice as great as that of all France. Of this great extent of land, however, not more than thirty millions of acres are granted, and of these not more than five millions are cultivated. Of the productiveness of this region, we have the following among similar testimony: "So great is the fertility of the soil in Canada, that fifty bushels of wheat per acre are frequently produced on a farm where the stumps of trees, which probably occupy an eighth of the surface, have not been eradicated; some instances of sixty bushels an acre occur; and near York, in Upper Canada, one hundred bushels of wheat have been obtained from a single acre. In some districts wheat has been successively raised upon the same ground for twenty years without manure." \* Montreal, the chief trading port of St. Lawrence, is the outlet of the greater portion of the produce of Upper Canada.

So great are the natural advantages in the neighbourhood of the St. Lawrence, that in a memorial to our Government recommending an extensive plan of colonization of the Irish population, this is the portion of the world selected as the best fitted for the purpose. "It is in the part of the world where the greatest abundance of human food is brought into the market at the lowest price. It already contains a population, for the most part engaged in agriculture, exceeding any possible amount of annual Irish immigration; and so very large a portion of its fertile soil is still uncultivated, that for many years to come every addition to its numbers by immigration will add to its capacity of receiving more immigrants. \* \* \*

\* Butler.

If a large body of Irish emigrants were despatched to an uninhabited country, or one containing but few inhabitants, it would be necessary to supply them for a year or two with food procured from other countries at a great expense. The first colonists of South Australia and New Zealand imported nearly all their food during the first two or three years of their settlement, and the greater part of that food was sent to them from this country. If a million of Irish emigrants were sent to any other country but North America, it would be necessary to send along with them, or after them, about four million barrels of flour. But," by going to North America, "the emigrants would fall in with a great store of food ready for the mouths of new comers, because it is there only that an abundance of fertile land exists in combination with a skilful agricultural population many times more numerous than any conceivable amount of annual emigration."

That the United States of America also possess immense resources for the production of food is well known. A journey across the State of New York affords the most satisfactory evidence of the great natural advantages of this region, of which New York itself is the great outlet.

Around the great chain of the North American lakes, of which Lake Erie is the most southerly, is a vast territory about six times as extensive as the whole of England, containing one hundred and eighty millions of acres of arable land, a large portion of which is of surpassing fertility. It is expected that a vast population will eventually spring up in this attractive region, which has already drawn great numbers to its culture. Viewing this state of things prospectively, the Financial Report of the Legislature runs thus :—"There are peculiar reasons why the proportion of agricultural products of this great inland population should so far exceed that of other nations. The exuberance of their soil, the salubrity of their climate, and the cheapness of their lands, (arising from a vast supply within their limits,) will enable them always to furnish food to every other portion of the continent, on more advantageous terms than it can be elsewhere produced. Labour there reaps its best reward, and harvests of a hundred fold repay its exertions."

Until lately the exports of wheat from the United States, have been comparatively trifling; the principal corn trade being carried on in flour, not in grain. The shipments of flour have been very extensive from New York, New Orleans, Baltimore, and other ports. Every kind of flour, whether of

wheat, rye, or Indian corn, is inspected by an appointed officer before it is shipped. The size and weight of each barrel is regulated by government, and the inspector ascertains that every barrel contains 196lbs. of flour, and each half-barrel 98lbs. He next determines the quality of the flour; the best being branded *Superfine*, the second *Fine*, the third *Fine Middlings*, the fourth *Middlings*. Flour which is not marketable is branded *Bad*, and its exportation forbidden. Maize flour is branded *Indian Meal*, and may be exported in hogsheads of 800lbs. The inspection takes place at the time and place of exportation, under penalty of five dollars per barrel. Persons altering or counterfeiting marks or brands, forfeit one hundred dollars; and persons putting fresh flour into barrels already marked, or offering adulterated wheaten flour for sale, forfeit in either case five dollar per barrel. Our imports of wheaten flour from the United States in 1831, amounted to 899,430 barrels, and from Canada in the same year we obtained 189,885 quarters of wheat, and upwards of ninety-six hundred weight of flour. The freight of flour from New York to England was in 1842 not more than 1s. to 1s. 6d. per barrel. The last few years have seen a vast increase in the supplies sent from the United States to this country; so that the President's addresses paint an extraordinary picture of prosperity in the export trade, owing to the immense quantities of food going to England; and also remind the farmers that they are getting much higher prices than heretofore for their produce.

But if it has been so ordered, that an abundant harvest in America should in a very material degree assist England and Ireland in their difficulties; yet it does not appear that we are at liberty to reckon on this aid as constant or lasting. An acute writer on our agricultural resources has the following remarks bearing on this subject: "The great source of error, with regard to the United States, is in judging of it by the enormous extent of its territory, instead of by the number of hands which can be applied to the raising of food. This mode of judging is altogether fallacious; for the amount of labour which can be applied to the soil, is the principal test of production. This is proved by the fact, that we raise nearly as large an amount of agricultural produce in this little island, which is a mere speck, when compared with the United States, as the people of that country raise from the whole of their vast territory. A little consideration as to what are the practical difficulties in raising, reaping, thrashing out, and getting to



market any considerably increased quantity of grain, will show that this must be the case. In the great corn-growing districts of England and Scotland, that is, in Lincolnshire, Cambridgeshire, and the Lothians, the resident population, though four or five times as thick on the ground as the agricultural population of any of the grain growing states of America, would be unable to secure the harvest, if it was not for the immense influx of Irish reapers at harvest time. It was only last year that a slight delay in the arrival of the usual bands of Irishmen produced great alarm in Lincolnshire and the Isle of Ely; and if they had not arrived at all much grain would have been lost. This is the grand difficulty with regard to the cultivation of grain in thinly peopled countries. There is no difficulty in preparing large quantities of land, as that is an operation which may be spread over several months; and there is even less difficulty in sowing the land, as one man can sow a great breadth in a single day; the difficulty is in obtaining the necessary supply of labour to cut down and carry in a fortnight or three weeks the harvest of the whole year." If the want of labourers during the harvest is often felt even in this country, "how much greater must it be in the wilderness of the west, with a climate like that of America, under which each grain crop ripens simultaneously. The difficulty is so great that no effort is even made to reap much of that Indian corn, which makes such an astounding figure in American statistics. The usual course over thousands of acres, is to turn the pigs into this grain, to eat as much as they like; and this is even done with regard to wheat. A gentleman of our acquaintance saw an immense herd of pigs turned into a magnificent field of wheat of sixty acres, which was thus completely laid waste, according to our European notions."

The above remarks lead us to notice more particularly the qualities of maize or Indian corn, which has been of so much service in Ireland during the season of distress, and which will in all probability continue to be a most important article of commerce. From the partial attempts to cultivate maize in this country, many persons are acquainted with its appearance, and luxuriant growth; its strong, reedy, jointed stems, broad leaves, tasselled flowers, and large thick ears, plentifully supplied with seeds or grain.

There are several varieties of Indian corn, supposed to arise from difference of climate; but there is no doubt that America is the native place of the plant; for there, and in the

West India Islands, it is found growing wild, and is cultivated to the greatest perfection. The growth of American maize is various, being from seven to ten feet in favourable situations, and in some cases attaining the extraordinary height of fourteen feet without losing any of its productiveness. The value of the grain to America is nearly as great as that of rice to India. It forms a principal food of the inhabitants of the United States, and almost the sole support of the Mexicans. It is also largely consumed in Africa. It is said to be much less subject to disease than our wheat, no such thing as blight, mildew, or rust, being known to the crop. The chief enemies to the maize farmer are insects in the early stages, and birds in the later periods of cultivation.

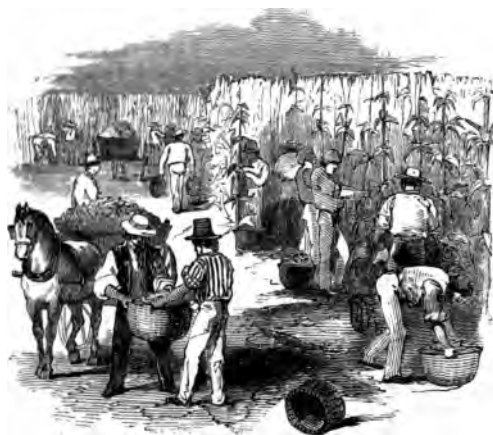
The increase of this crop compared with that of other kinds of wheat is exceedingly large. In Mexico, where it is the most luxuriant, its productiveness is almost incredible. We are assured that, in some particularly favoured spots of that country, it has been known to yield an increase of eight hundred for one; while it is by no means uncommon, where artificial irrigation is practised, to gather from three hundred and fifty to four hundred measures of grain for every one measure that has been sown. In other places where no artificial means are used, forty or sixty bushels are gained for each one sown.

The produce from maize in the United States is less luxuriant than in Mexico, but is very superior to that of other kinds of grain. Where the average crop of wheat does not exceed from fourteen to seventeen bushels, that of maize amounts to from twenty to thirty bushels. In some of the warm and moist regions of Mexico three harvests of maize may be annually gathered, but it is not usual to take more than one. The seed-time is from June to the end of August. In the United States, maize is generally planted about the middle of May, that it may escape frost, and the harvesting takes place a little later than that of wheat. This is an advantage to the American farmer, making it more possible to secure a portion of the crop; but in all circumstances there is much difficulty in conducting harvest work in a country where the growth and maturity of crops are so rapid.

The culture of maize is very successfully carried on in Georgia. The ordinary increase in good years is from one hundred to one hundred and twenty fold; but by the best ears being selected for seed, and careful attention to the crops, the corn has increased in size and productiveness, so as to yield two hundred and fifty fold. This result was first pro-

duced by a cultivator named Baden; hence the choice corn obtained by his method is called Baden corn. The common wheat-harvest is over in Georgia by the middle of June. The maize is then in a flourishing condition, and is gathered some weeks later.

The maize-harvest is very differently conducted to the wheat-harvest. When the corn is ripe the ears are plucked off and thrown into baskets: these are again emptied into carts, which convey the store at once to the barn. The stalks are left standing some time longer, and being then cut down



THE MAIZE-HARVEST.

near the ground, they are tied up in bundles and stacked in a dry place, being used for food for cattle. The ears of corn are preserved in bins or cages, and are not shelled until they are about to be sent to market. Shelling the corn is easily performed, but is rather a tedious operation. An old blunt sword or a piece of iron hoop is fixed across the top of a tub, each ear is then taken in both hands and scraped lengthwise smartly across the edge of the iron until all the grains are removed. In this manner an industrious man will shell from twenty to twenty-five bushels per day. Two bushels of ears will yield one bushel of shelled corn. The rude method

above described has in some places yielded to a simple machine, which expedites the work.

Of the advantages and uses of Indian corn we have had many notices within the last twelve months, but perhaps none have greatly added to the testimony given long ago by Dr. Franklin. He says, "It is remarked in North America, that the English farmers when they first arrive there, finding a soil and climate proper for the husbandry they have been accustomed to, and particularly suitable for raising wheat, despise and neglect the culture of Indian corn; but observing the advantage it affords their neighbours, the older inhabitants, they by degrees get more and more into the practice of raising it; and the face of the country shows from time to time that the culture of that grain goes on visibly augmenting.

"The inducements are the many different ways in which it may be prepared, so as to afford a wholesome and pleasing nourishment to men and other animals. First, the family can begin to make use of it before the time of full harvest; for the tender green ears, stripped of their leaves, and roasted by a quick fire till the grain is brown, and eaten with a little salt or butter, are a delicacy. Secondly, when the grain is riper and harder, the ears, boiled in their leaves and eaten with butter, are also good and agreeable food. The tender green grains dried, kept all the year, and mixed with green *haricots* (kidney-beans) also dried, make at any time a pleasing dish, being first soaked some hours in water and then boiled. When the grain is ripe and hard, there are also several ways of using it. One is to soak it all night in a *lessive* or lye, and then pound it in a large wooden mortar, with a wooden pestle; the skin of each grain is by that means skinned off, and the farinaceous part left whole, which being boiled swells into a white soft pulp, and eaten with milk, or with butter and sugar, is delicious. The dry grain is also sometimes ground loosely, so as to be broken into pieces of the size of rice, and being winnowed to separate the bran, it is then boiled and eaten with turkey or other fowl, as rice. Ground into a finer meal they make of it, by boiling, a hasty pudding or bouilli, to be eaten with milk, or with butter and sugar: this resembles what the Italians call *polenta*. They make of the same meal, with water and salt, a hasty cake, which, being stuck against a hoe or other flat iron, is placed erect before the fire, and so baked to be used as bread. Broth is also agreeably thickened with the same flour. They also parch it in this manner. An iron pot is nearly filled with sand, and set on the fire till the sand is very hot; two or three

pounds of the grain are then thrown in, and well mixed with the sand by stirring. Each grain bursts and throws out a white substance of twice its bigness. The sand is separated by a wire sieve, and returned into the pot to be again heated and the operation is repeated with fresh grain. That which is parched is pounded to a powder in mortars; this being sifted will keep long for use. An Indian will travel far, and subsist long, on a small bag of it, taking only six or eight ounces of it per day, mixed with water. The flour of maize, mixed with that of wheat, makes excellent bread, sweeter and more agreeable than that of wheat alone. To feed horses it is good to soak the grain twelve hours; they mash it easier with their teeth, and it yields them more nourishment. The leaves stripped off the stalks after the grain is ripe, tied up in bundles when dry, are excellent forage for horses, cows, &c. The stalks, pressed like the sugar-cane, yield a sweet juice, which, being fermented and distilled, makes an excellent spirit; boiled without fermentation it affords a pleasant syrup. In Mexico, fields are sown with it thick, that multitudes of small stalks may arise, which being cut from time to time like asparagus, are served in desserts, and their sweet juice extracted in the mouth by chewing them. The meal wetted is excellent food for young chickens, and the old grain for grown fowls."

From a short tract lately published by Dr. Bartlett, of New York, we gain some important particulars as to the general price at which this valuable corn ought to be sold in England. It appears that maize has been commonly sold at the port of shipment at half a dollar per bushel, and that the expense of grinding into flour, and freight across the Atlantic, would make it three quarters of a dollar. Allowing another quarter of a dollar for retail profit, "it could be sold in the manufacturing towns of England at one dollar per bushel, or about four shillings and fourpence sterling. Now the bushel weighs at least fifty-eight pounds, which, at four and fourpence, is less than one penny per pound."

As an article of general domestic use, this maize flour appears to be as agreeable as it is economical. Besides ordinary puddings, cakes, rolls, and bread, which are made of it, there is a dish called *mush*, a sort of hasty pudding, which is very much used in America, and which shows the great advantage of this article as a cheap food. Describing this dish, Dr. Bartlett observes:—"I carefully weighed out one pound of this meal, and gave it to a person who understood the cooking of it. In the course of boiling, it absorbed five pints of water,

which was added at intervals until the process was complete. The bulk was again weighed, and gave as a result four pounds and a half. Such are the powers of expansion possessed by this kind of grain. On dividing the mass into portions, it was found to fill four soup plates of the ordinary size, and with the addition of a little milk and sugar, gave a plentiful breakfast to four servants and children." Thus, one pound of maize flour, valued at one penny, gave a substantial breakfast to four persons. This is certainly worth trying in England, and would, no doubt, be soon adopted by numbers, could they obtain the flour. But, strange to say, although a large quantity of maize flour is sent to England, there is the greatest difficulty in obtaining any for use. It appears to be kept in the hands of bakers and others, who, no doubt, employ it largely in mixing with wheaten flour, but who deny it to their customers, except at a price equal to that of wheaten flour. The writer has made inquiries at many bakers' shops in London, and also at several corn stores, but has not been able to obtain any of this meal. One individual confessed to having a quantity of it, but refused to sell except at the high price of ordinary flour. It is to be hoped that this will not continue long, but that the valuable grain, will soon be better known and appreciated by the public at large. Let a general demand be excited for maize flour, and the monopoly will soon cease to exist. In large families it would be a great saving to employ this flour mixed with wheaten flour for pastry of all kinds, plain cakes, &c., even supposing any prejudice to exist against its use in bread. But those who have tried it, assure us that bread is much sweeter and better with a portion of this flour; and if we may judge by the bread sold in a few of our shops as Indian-corn bread, we fully agree in that opinion. It is light and wholesome, and does not become dry or stale so soon as ordinary bread.

It should also be remembered that rye meal is an article that may be advantageously used to mix with other flour in time of scarcity. The preference shown in England for white-looking bread prevents the frequent use of this meal, but there is no doubt of its wholesomeness and utility; and by using a certain portion of it, a medium might be attained between the dark-coloured bread of the continent, and our own very white loaves.

In country places we sometimes meet with plain household bread, made from the whole meal of wheat without the separation of the bran. Such bread is far more substantial, and, as

it appears, more nutritive and wholesome, than fine wheaten bread. A valuable paper on the nutritive qualities of the bread now in use, has been contributed by Professor Johnston to Blackwood's Magazine, and in it he has proved satisfactorily, that, by rejecting the bran, we lose a large amount of nourishment of the most important kind.

Wheat is well known to consist of two parts; the inner grain, which gives pure white wheat, and the skin, which, when separated, forms the bran. The miller cannot entirely peel off the skin from his grain, and thus some of it is unavoidably ground up with the flour. But by sifting he separates it more or less completely, and thus he obtains his seconds, middlings, &c. The whole meal, as it is called, of which brown household bread is made, consists of the entire grain ground up together—used as it comes from the mill—stones unsifted, and therefore containing all the bran. Thus the finest wheat flour may be said to contain no bran, while the whole meal contains all that grew naturally upon the grain.

The inquiries of Professor Johnston are, "What is the composition of these two portions of the seed; [the inner grain or pure wheat, and the skin or bran;] how much do they respectively contain of the several constituents of the animal body; how much of each is contained also in the whole grain?"

The answers to these inquiries show the value of whole meal or household bread in forming and sustaining the three principal solids of the human body—fat, muscle, and bone. The following are the more important particulars:—

1. *The fat*.—Of this ingredient a thousand pounds of—

|                     |   |   |   |         |
|---------------------|---|---|---|---------|
| Whole grain contain | . | . | . | 38 lbs. |
| Fine flour          | „ | „ | „ | 20 „    |
| Bran                | „ | . | . | 60 „    |

So that the bran is much richer in fat than the interior part of the grain, and the whole grain ground together richer than the finer part of the flour in the proportion of nearly one half.

2. *The muscular matter*.—A thousand pounds of whole grain and of the fine flour, contained of muscular matter respectively—

|             |   |   |   |   |          |
|-------------|---|---|---|---|----------|
| Whole grain | . | . | . | . | 156 lbs. |
| Fine flour  | . | . | . | „ | 130 „    |

Thus, of the material out of which the animal muscle is to be

formed, the whole meal or grain of wheat contains one fifth more than the finest flour does. For maintaining muscular strength, therefore, it must be more valuable in an equal proportion.

3. *Bone material and saline matter.*—A thousand pounds of bran, whole meal, and fine flour contain respectively—

|            |   |   |   |   |   |          |
|------------|---|---|---|---|---|----------|
| Bran       | . | . | . | . | . | 700 lbs. |
| Whole meal | : | : | : | : | : | 170 "    |
| Fine flour | : | : | : | : | : | 60 "     |

So that in regard to this important part of our food necessary to all living animals, but especially to the young during their growth, the whole meal is three times more nourishing than the fine flour.

Taking the three essential elements of a nutritive food, thus existing in wheat, and comparing their respective amounts in the whole meal and in the fine flour, we find that on the whole the former is one half more valuable for fulfilling all the purposes of nutrition than the fine flour.

"It will not be denied," says our author, "that it is for a wise purpose that the Deity has so intimately associated in the grain the several substances which are necessary for the complete nutrition of animal bodies. The above considerations show how unwise we are in attempting to undo this natural collocation of materials. To please the eye and the palate, we sift out a less generally nutritive food—and to make up for what we have removed, experience teaches us to have recourse to animal food of various descriptions.

"It is interesting to remark, even in apparently trivial things, how all nature is full of compensating processes. We give our servants household bread; while we live on the finest of the wheat ourselves. The mistress eats that which pleases the eye more, the maid what sustains and nourishes the body better."

These important remarks are followed by an allusion to the experiments of Majendie and others, who found that animals died in a few weeks if fed only upon fine flour, but lived long upon whole meal bread. Thus the coarse bread given to prisoners is in fact a mercy to them, for being restricted from all other food there would not be sufficient nutriment in fine white loaves long to sustain life. The nutritive properties of bran are shown in its effects in fattening pigs, &c.; and thus this apparently woody and useless material is found to produce valuable results.



Wheat, taken in the natural mixture found in the whole seed, is the most nutritive of all vegetable substances, and is, therefore, when at moderate price, quite as economical as some of the cheaper kinds of grain. It is only when wheat has risen to an unusual price that substitutes are sought for it in inferior articles. According to Liebig, Boussingault, and others, 107 parts of wheat are equal in nutritive power to 111 of rye, 117 of oats, 130 of barley, 138 of Indian corn, 177 of rice, 894 of potatoes, and 1335 of turnips.

Severe as the evils have been to Ireland in the failure of the potato crop, there are many persons who think that much good will eventually result to that country and to our own, from this convincing proof of the uncertainty of the potato, and of its unfitness, on that account, to be the common food of the people. No doubt it is exceedingly desirable that the potato should never be made more than a subsidiary article: for, as above shown, its powers of nutrition are very low compared with wheat and other grain. "Wherever it supersedes bread," says Mr. McCulloch, "the population, though there should be no increased demand for labour, invariably increases; wages are gradually lowered; and poverty and its attendant train of evils diffuse themselves over the vicinage. We are not, therefore, of the number of those who regard the potato rot as a manifestation of the Divine wrath, and who suppose that its continuance will be ruinous to the poor. On the contrary, we do not hesitate to say, that, judging of its influence in time to come by that which it has hitherto exercised, we should look upon the total extinction of the plant as a blessing and not as an evil. The transition from an inferior and cheap, to a superior and more costly species of food, might, no doubt, occasion considerable inconvenience in some parts of Great Britain, while in Ireland it would be a matter of much difficulty. But this inconvenience and difficulty, how troublesome soever in the mean time, would be got over in no very lengthened period; and when the change had once been accomplished, the benefit to the country, and especially to the labouring classes, would be greater than can be easily imagined. It would not, we think, be difficult to show that the gradually extending use of the potato has done more to depress the labourers, or, at all events, to countervail those causes that would have raised them to a higher position than all the other unfavourable influences to which they have been exposed put together. And supposing such to be the case, it is matter for grave consideration, provided (as is indeed most probable) the

potato rot should turn out to be accidental and temporary only, whether some restrictions should not be laid on the culture of the root. The tendency to resort to the potato when it is abundant is so very strong, that in the long run it is almost sure to prevail: but this resort is necessarily productive of so many evils, and places the very existence of a people in such imminent hazard, that no means should be left untried by which it may be averted."

Sentiments like these, coming from such a writer, are worthy our attentive consideration, and we must allow that a total dependence on the potato crop is a great evil. Should past calamities result in teaching the Irish and English peasantry to exert themselves earnestly to obtain a better food, it will indeed be another proof of the mysterious working of Providence, by which the temporary sufferings of a part of the nation have been made subservient to the lasting benefit of the whole. May He who has the wills and affections of men within his power, enable us to derive such lessons from the chastisement we have received, and such motives for industry and thankfulness, as may render a season of deficient food a time of abundant instruction and solid improvement to us all! and in looking forward to the future may we never forget, that the times and the seasons are in the hands of One, whose blessing miraculously multiplied the food of His followers, causing five loaves to feed "five thousand men, besides women and children," and seven loaves to feed "four thousand men, besides women and children." By the same Divine compassion our harvests may be exceedingly multiplied, and our wants abundantly supplied; and for our individual comfort we have the gracious promise, that although "the young lions do lack and suffer hunger," yet "they that seek the Lord shall not want any good thing."—Ps. xxxiv. 10.

## ADDENDA.

---

THE following are a few of the simplest Recipes we have met with for cooking Indian corn meal; but those who require a greater variety, including articles of luxury as well as of economy, may find abundant directions in Miss Leslie's "Indian Meal Book,"\* which comprises the best American recipes.

### INDIAN MUSH.

Have ready, over a good clear fire, a pot or large saucepan of boiling water. Put a sufficiency of Indian meal into a large pan, and place it beside you. Take in one hand a wooden spoon, and with the other hand throw, gradually, the Indian meal into the boiling water, a handful at a time, till you have the mush as thick as *very stiff* porridge. Give it, between each handful, a stirring; otherwise it will be rough, lumpy, and ill-mixed. Add a little salt: a *very* little will suffice, as *salt* mush is usually considered unpalatable. After the mush is sufficiently thick and smooth, keep it boiling an hour longer, stirring it up from the bottom frequently, to prevent its burning. Then cover the pot closely, and place it where it will not boil hard, but only simmer, for another hour. The goodness and wholesomeness of mush depends greatly on its being long and thoroughly boiled, and on being made thick and smooth. If kept three or four hours over the fire, first boiling hard, and then simmering, it will be all the better. Send it to table hot, and in a deep dish or pan. Eat it with sweet milk, buttermilk, or cream; or with butter and sugar, or butter and treacle.

Cold mush that has been left, may be cut into slices and fried next day in butter or lard, or in drippings of roast veal or pork.

\* London: Smith, Elder, and Co., 1846.

This is the simplest mode of cooking Indian meal. It resembles the burgoo of the Scotch, and the stirabout of the Irish, but is infinitely sweeter and more nutritious, being made of Indian instead of oatmeal.

---

#### FINE INDIAN BREAD.

Sift four quarts of Indian meal, and half a pint of wheat flour into a large deep pan, mixing them well. Make a deep hole in the centre. Pour a quart of warm water into a mug or bowl that contains half a pint of strong fresh yeast, and stir them together; then pour them into the hole you have made in the meal. Take a spoon, and with it mix lightly into the liquid, enough of the surrounding meal to make a thin batter, which must be stirred till it is quite smooth and free from lumps; then strew a handful of wheat flour over the surface, scattering it thinly, so as to cover the whole. Warm a clean thick cloth, and lay it folded over the top of the pan; then set it in a warm place to rise,—nearer the fire in winter than in summer. When it is quite light, and has risen so that the surface is cracked, strew on two table-spoonfuls of salt, and removing it from the fire, begin to form the whole mass into a dough; commencing round the hole that contains the batter, and adding, gradually, sufficient lukewarm water (which you must have ready for the purpose) to mix it of the proper consistence for bread. When the whole is completely mixed, knead it hard for at least half an hour; then strew a little more flour thinly over it; cover the pan of dough, and, set it again in a warm place. Let it remain untouched for half an hour; then flour your paste-board, divide the dough equally, and make it into loaves. This quantity will be enough for two loaves. Have the oven ready, put in the loaves, and bake them about three hours, more or less, according to their size. When you think the bread is done, try it with a knife. If the blade comes out clammy, let the bread remain in the oven a while longer. Have ready clean thick towels damped with cold water. As soon as the bread comes out of the oven, wrap up each loaf closely in one of those towels, and stand it up on end to cool slowly. The damp cloths will prevent the crust, becoming too hard while the loaves are cooling. Keep the loaves in a covered box or basket.

*Indian bread, and every sort of Indian cake, is best when fresh.*

Excellent bread may be made of equal portions of wheat meal and Indian; or of three parts wheat and one part Indian. Indian meal gives a peculiar sweetness to wheat bread.

If the dough has become sour by standing too long, it may be remedied by dissolving a teaspoonful of pearl-ash in a small teacup of milk-warm water, sprinkling the dough with it, and then giving it another kneading; after which let it stand half an hour (not more) before it is put into the oven, that the pearl-ash may have time to take effect, and correct the acidity.

---

#### INDIAN HASTY-PUDDING.

Put three quarts of water into a saucepan, and add a teaspoonful of salt. Set the saucepan over a good fire (entirely free from smoke), and when the water boils hard, begin to stir in three quarts or more of Indian meal, a handful at a time, till it is very thick and smooth, like a very soft dough, adding, gradually, a quarter of a pound of butter as you proceed. Continue to boil and stir it till the spoon or stick will stand upright in the middle. Send it to table hot, and eat it with milk or cream, or with treacle or sugar.

---

#### INDIAN MEAL-GRUEL.

This is excellent nourishment for the sick. Having sifted some Indian meal, mix in a quart bowl two table-spoonfuls of the meal with three of cold water; stir it till quite smooth, pressing out the lumps against the side of the bowl. Have ready a very clean saucepan with a pint of boiling water; pour this scalding hot on the mixture in the bowl a little at a time, and stir it well, adding a pinch of salt. Then put the whole into the saucepan, set it on hot coals, and stir it till it boils, making the spoon go down quite to the bottom, that the gruel may not burn. After it has come to a boil, let it continue boiling half an hour, stirring it frequently and skimming it.

Give it to the invalid warm, in a bowl or tumbler. It may be sweetened with sugar and eaten with a spoon. If the physician permits, some grated nutmeg may be added, also a little white wine.

## JOHNNY CAKE.

Plain Johnny Cake is made by forming a soft dough, of a quart of sifted Indian meal with a teaspoonful of salt, mixed gradually with about a pint of boiling water. The dough is beaten well, until it is light and spongy, then rolled out thickly and evenly on a smooth, hard board, and set upright before a bright fire. When done it is cut into squares, and eaten with butter. It may be cooked on a tin; but not so well.

A superior Johnny cake may be thus made:—Take one quart of milk, three eggs, one teaspoonful of carbonate of soda, one teacup of wheat flour, and Indian meal sufficient to make a batter of the consistency of pancakes. Bake quickly in pans previously buttered, and eat it warm with butter or milk.

---

HOMINY.

Hominy is Indian corn, shelled from the cob; divested of the yellow skin (so as to be perfectly white) and then dried. Having washed it well, through two or three waters, put it into a pan, pour boiling water upon it; cover it, and let it soak all night, or for several hours. Drain it; put it into a clean pot or saucepan; allow two quarts of water (either hot or cold) to every quart of hominy, and boil it hard during five or six hours, or more, stirring it frequently. Then drain it well through a sieve or cullender, till it is as dry as possible. Put it into a deep dish, add some fresh butter to it, and a little salt or pepper; send it to table hot, to eat with any sort of meat, particularly with corned beef, pork, or bacon. If properly prepared it is very wholesome and strengthening. What is left may be re-boiled next day for an hour; or it may be made into flat cakes, adding a little wheat flour, and fried in lard or butter.

Hominy that has been already boiled is good to thicken soup, instead of rice or barley.

## INDIAN DUMPLINGS.

Mince half a pound of beef suet as fine as possible, and then dredge it with wheat flour, to prevent its getting into lumps when boiled. Mix it into three pints of Indian meal, throw in a teaspoonful of salt, and add gradually milk enough to moisten the meal so as to make it a stiff dough. Knead it a while in the pan; then divide the dough into equal portions; and, having floured your hands, make each portion into a ball about the size of a small orange; then flatten each ball with a rolling pin, and beat them on both sides to make them light and flaky. Tie up each dumpling in a small thick cloth that has been previously dipped in hot water, and then shaken out and dredged with flour. There must be space left for them to swell. Put them into a pot or saucepan of boiling water, and boil them well during two hours or more. When done, dip each dumpling in cold water before you untie the cloth; then turn them out carefully on a dish, and send them to table hot.

They may be eaten with any sort of boiled meat, either fresh or salt; or served up after the meat is removed, with butter and sugar or treacle.

---

## INDIAN MEAL POLENTA.

Put two gallons of water in a stewpan, and boil; take some Indian meal, the quantity depends on the quality, and add it gradually to the water, stirring it all the time, so that it should be quite smooth and thick: add three ounces of salt: simmer on the side of the fire for two hours, taking care that it does not burn; place it in baking tins; place a thin layer of sausage-meat, or black pudding upon it, and cover it with more of the meal; bake it for twenty minutes and serve.

This is an excellent and cheap dish, and fit for the tables of the wealthy if a strong gravy is poured over it when served.\*

---

\* SOYER'S Charitable Cookery.

## SAVOURY HOMINY.

Take two quarts of Indian corn and soak it for twenty-four hours in water, put it into a pot containing two gallons of boiling water, and simmer for five hours; draw off the water, if any, add a quarter of a pound of dripping or butter, two onions, sliced thin, three ounces of salt, put it on the fire for twenty minutes, keep stirring it all the time, so that it does not burn, and serve. This will produce two gallons of excellent food. The purée made from the whole corn as above, is much sweeter and more wholesome than that made from the ground meal. The great mistake at present in the use of Indian meal is, that it is not cooked enough, it being used similar to flour; it should, on the contrary, be well mixed with boiling water and allowed to simmer for never less than two hours; it then loses its raw taste and increases in quantity.\*

\* SOYER.

THE END.



LONDON.

Printed by S & J. BENTLEY, WILSON, and FLETCHER,  
Fangor House, Shoe Lane.





